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Summer

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JOB COMPLETION REPORT
INVESTIGATIONS PROJECT

MAY 5 1976
STATE DOCUMENTS

State of Montana

Project No.: W-73-R-8

Name Wildlife Investigations - District 3

Job No.: A-1

Title Big Game Survey and Investigation - Summer of 1956-1960 Gravelly-Snowcrest Rumen Collections.

Period Covered: May 1, 1962 to June 30, 1963.

Summarization of 1956-1960 Gravelly-Snowcrest Rumen Collections

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Abstract

Collections of ungulate rumens from the Gravelly-Snowcrest-Centennial area were made from 1956 through 1960. The rumens, from elk, deer, cattle and sheep, were made on an opportunistic basis generally in conjunction with other field activities. This report serves to assemble all such data and to relate circumstances and conditions concerning the collections.

Procedure

Rumens were analyzed in the wildlife laboratory at Bozeman using modifications of procedures first described by Martin et al (1946). Volumes in cubic centimeters for each item, frequencies when more than one rumen was included in the tabulation, and percentages of the total volume of each sample are presented.

Findings

Table I lists, by species, the numbers of rumens collected each year. Elk rumens were obtained in October and November from the hunter harvest. The eleven deer rumens were obtained in March and April 1959 on the Wall Creek area. Sheep and cattle rumens were obtained from animals butchered by herders or ranchers for food in the field, or from animals which died from accidents or poison. Sheep rumens obtained in 1957 were from animals bought by the Department and slaughtered primarily for the purpose of obtaining the rumen.

Deer Collection on Wall Creek, Spring 1959

Table II presents the analysis of 11 mule deer rumens collected from Wall Creek in March and April 1959. Browse and forb items constituted 37% and 43%, respectively, of the total sample. Big sage, rabbitbrush, phlox and pussytoes were identified in the sample. These items suggest, along with the relatively large amounts of conifer and grass, a "starvation diet", which is verified by the browse surveys, (which suggest heavy utilization of key species), and the observed winter mortality and low fawn production in the area. (Ellig, 1963).

Elk Collections.

Hunting season rumen collections from 1956 through 1959 bear out the findings of Rouse (1957), concerning fall elk food habits in this area. Grasses constituted the major forage source (Tables III, Fig. 1), supplying about three fourths of the indicated diet. Bluebunch fescue was an important food item, as determined by Rouse

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(op. cit.)

Some browse and forb items identified in the 59 rumens included aspen, willow, asters, lupine, and thistle.

Cattle Collections.

Nine hereford rumens were collected, two in 1959 and seven in 1960 (Table IV and V). Grass content in the rumens were from 79.5% to 97.5%. Forbs ranged from traces to 19.5% in the sample. Incidence of browse items ran from 1% to 3%.

Identifiable browse and forb items in the sample included lupine, polygonum, and willow.

Sheep Collections.

The sheep rumens show a wide range of variation in aggregate percentages of the three forage classes (Table VI, VII, Fig. 2). Grasses constituted 35% to 85% of the total percentages with an average of 60% for the sample. Forbs constituted from 8 to 63% of the aggregate percentages in the samples with an average of 28%. It is noted that grasses constituted the least proportion (37.7% average), and forbs the greatest proportion (54.8%) in 1960. The 1957 and 1959 samples were similar in forb percentages with 25% and 30%, respectively. Browse and forb items identifiable in the samples included bastard toadflax, lupine, eriogonum, cinquefoils, sticky geranium, wyethia, antennaria, willow and snowberry.

One can speculate that the indicated higher amounts of grass which occurred in these rumens may reflect forage availability more so than forage preference on the sheep ranges in the area, since sheep are generally considered as being primarily weed-feeders.

Discussion.

Food habits of a given species are generally dependent upon forage preference and forage availability. Consequently, range studies to indicate kinds and amounts of forage plants available, and studies of animal distribution by vegetative type and season are of paramount importance in a food habits study. Such data were not gathered in conjunction with these rumen collections. Generalized vegetative descriptions of the area have been made by Knowlton (1960), Peek (1963), and, in more detail, by Evanko and Peterson (1955). Animal distribution studies are available only for elk (Rouse, op. cit.). However, the history of the animal, where it had moved and fed, before its rumen was collected, is not available for any of this collection.

The rumen collections can be evaluated on a generalized basis. Not only are the collections subject to the usual limitations involved in rumen analysis, but the lack of knowledge concerning where the animals had fed before collection, further obscures meaningfulness of the information. The information reflects, the relative amounts each major forage class occurred within the sample. Individual items are mentioned only to indicate their identification and should not be construed to reflect true proportions within the samples. One can say, as an example, that the sheep rumens did contain willow, but to what degree this plant occurred in the diet is only generally suggested. The best value of this data may be as supplemental to further detailed studies.

Prepared by James M. Peek

Date September 1963 Approved by Wynn G. Freeman

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Table I. Numbers of rumens, kinds, and dates of collection, from 1957-1960 in the Gravelly-Snowcrest-Centennial.

Species	Number Rumens					
	1956	1957	1958	1959	1960	Totals
Dom. sheep	-	6	-	17	4	27
Cattle	-	-	-	2	7	9
Elk	10	10	4	40	-	64
Deer	-	-	-	11	-	11

TABLE II. ANALYSES OF ELEVEN MULE DEER RUMENS COLLECTED FROM WALL CREEK STUDY UNIT, MADISON COUNTY.

		MARCH 1959 6 SPECIMENS			APRIL 1959 5 SPECIMENS			WINTER 1959 (MARCH - APRIL) 11 SPECIMENS		
		FREQUENCY OF OCCURRENCE	PERCENT BY VOLUME		FREQUENCY OF OCCURRENCE	PERCENT BY VOLUME		FREQUENCY OF OCCURRENCE	PERCENT BY VOLUME	
			AVERAGE	RANGE		AVERAGE	RANGE		AVERAGE	RANGE
JUNIPERUS SCOPULORUM	RKY. MT. JUNIPER	1	3	0 — 12		-		1	2	0 — 12
PSEUDOTSUGA MENZIESII	DOUGLAS FIR	2	1	0 — 7	1	4	0 — 17	3	2	0 — 17
UNIDENT. CONIFER	BARE TWIGS	-	-		1	TR	0 — 1	1	TR	0 — 1
CONIFER		3	4	0 — 14	1	4	0 — 18	4	4	0 — 18
ARTEMISIA FRIGIDA	FRINGED SAGEWORT	5	4	0 — 8	5	3	1 — 7	10	3	0 — 8
ARTEMISIA TRIDENTATA	BIG SAGEBRUSH	6	9	2 — 15	4	3	0 — 6	10	7	0 — 15
ARTEMISIA SPP.	SAGEBRUSH	2	1	0 — 4	1	TR	0 — TR	3	1	0 — 4
BERBERIS REPENS	OREGON GRAPE	-	-		1	1	0 — 6	1	1	0 — 6
CHRYSOTHAMNUS SPP.	RABBITBRUSH	6	7	1 — 22	4	1	0 — 2	10	5	0 — 22
POPULUS SPP.	POPLAR	-	-		1	1	0 — 3	1	TR	0 — 3
SALIX SPP.	WILLOW	1	1	0 — 7	-	-		1	TR	0 — 7
UNIDENT. BROWSE	BARE TWIGS	6	20	2 — 49	5	11	5 — 18	11	16	2 — 49
BROWSE		6	42	14 — 79	5	20	14 — 24	11	33	14 — 79
TOTAL BROWSE		6	46	29 — 79	5	24	14 — 42	11	37	14 — 79
ANTENNARIA SPP.	PUSSYTOES	5	6	0 — 26	5	8	TR — 20	10	6	0 — 26
COMPOSITAE	COMPOSITE FAMILY	4	1	0 — 3	-	-		4	1	0 — 3
ERIOGONUM SPP.	ERIOGONUM	-	-		2	1	0 — 2	2	TR	0 — 2
HEUCHERA SPP.	ALUMROOT	-	-		1	2	0 — 8	1	1	0 — 8
PHLOX SPP.	PHLOX	6	9	1 — 26	5	8	TR — 16	11	8	TR — 26
UNIDENT. FORBS	STEMS, LEAVES	6	24	11 — 43	5	30	14 — 41	11	27	11 — 43
TOTAL FORBS		6	40	17 — 63	5	49	22 — 70	11	43	17 — 70
TOTAL GRASS		5	14	0 — 46	5	27	11 — 51	10	20	0 — 51

Table III. Elk Rumens - Gravelly Mountains 1959.

	Oct. 1959 6 Spec.			Nov. 1959 31 Spec.			Dec. 1959 3 Spec.			Total Fall 1959 40 Spec.		
		Freq.			Freq.			Freq.			Freq.	
	Vol. %	No.	%	Vol. %	No.	%	Vol. %	No.	%	Vol. %	No.	%
Conifer unident.	0.1	3	50	0.1	8	26	0.1	1	33	0.1	12	30
Conifer Total.	0.1			0.1	1	3	0.1			0.1	1	3
Arctostaphylos uva-ursi				tr	3	10				tr	1	3
*Artemisia frigida				0.2	1	3				0.1	3	8
Artemisia tridentata				tr	1	3	0.2	2	67	tr	3	8
Artemisia spp.				tr	9	29	0.1	1	33	tr	10	25
Berberis repems	0.2	4	67	0.4	9	29	6.5	1	33	0.8	14	35
Limnaea boreans							0.1	1	33	tr	1	3
Pinus contorta	tr	1	17	tr	1	3				tr	2	5
Pinus spp.	tr	1	17	tr	1	3				tr	2	5
Populus spp.	17.3	3	50	0.4	2	6	1.4	1	33	4.2	6	15
Salix spp.				1.9	5	16				1.3	5	12.5
Symphoricarpos spp.				tr	1	3				tr	1	3
Vaccimum spp.				0.4	3	10				0.3	3	8
Browse unident.	3.4	4	67	6.2	31	100	4.5	2	67	5.5	37	93
Browse Total.	20.9			9.5			12.8			12.4		
Total Browse.	21.0			9.6			12.9			12.4		
Achillea spp.	tr	2	33	tr	5	16	tr	1	33	tr	8	20
Antennaria spp.							1.1	1	33	0.1	1	3
Artemisia ludoviciana				0.1	1	3				0.1	1	3
Aster spp.	1.3	1	17							0.3	1	3
Cirsium spp.	tr	2	33	0.6	5	16				0.4	7	18
Compositae				0.1	4	13				0.1	4	10
Leguminosae				tr	1	3				tr	1	3
Lupine	0.2	4	67	1.3	29	94	1.8	3	100	1.1	36	90
Phlox spp.				0.1	8	26	0.1	2	67	0.1	10	25
Forbs unident.	3.1	6	100	5.8	28	90	16.6	2	67	6.0	36	90
Total Forbs.	4.6			8.1			19.6			8.1		
Gramineae	74.4	6	100	82.3	31	100	67.5	2	67	79.4	39	98

*Artemisia frigida probably should be placed in forb class.

Table IV. Herefords - 1959 - Gravelly Mountains.

Percent	Spec. No. 549 Adult Female Three Fork's Cow Camp Madison Co. Oct. 22, 1959	Spec. No. 617-18 mo. 10 day male Walt Sperry Beaverhead Co. Nov. 14, 1959	Total
Eleagnus com.	tr		tr
Populus spp.	tr		tr
Salix spp.		2.9	2.4
Browse unident.	2.5		0.5
Total Browse.	2.5	2.9	2.8
Lupinus spp.	tr		tr
Phlox hoodii	tr		tr
Forbs unident.		tr	tr
Total Forbs.	tr	tr	--
Gramineae	97.5	92.7	93.6
Juncaceae		4.4	3.5
Total Grass-like.	97.5	97.1	97.2

Table V. Summarization, 1960 Hereford Rumen Collection, Gravelly Range, Seven Collections in September.

	Poison Ck. (5)			Basin Ck. (1)		Patchtop (1)		Totals (7)		
	freq.	cc vol.	%	cc vol.	%	cc vol.	%	freq.	cc vol.	%
grass & grass-like plants	5	1151.8	79.5	222.5	87.6	335.9	91.6	7	1710.2	82.6
Equisetum	1	1.0	tr	-	-	-	-	1	1.0	tr
Total grasses.	5	1152.8	79.5	222.5	87.6	335.9	91.6	7	1711.2	82.7
unident. forbs	5	280.7	19.5	31.1	12.2	22.8	6.2	7	334.6	16.2
Lupinus	1	1.2	tr	-	-	-	-	1	1.2	tr
Polygonum	-	-	-	-	-	0.5	tr	1	0.5	tr
Total forbs.	5	281.9	19.5	31.1	12.2	23.3	6.3	7	336.3	16.3
unident. browse	3	13.4	0.9	0.4	tr	7.3	2.0	5	21.1	1.0
Salix	1	0.4	tr	-	-	-	-	1	0.4	tr
Conifer	1	tr	tr	-	-	-	-	1	tr	tr
Artr	1	0.4	tr	-	-	-	-	1	0.4	tr
Total browse.	4	14.2	1.0	0.4	tr	7.3	2.0	6	21.9	1.0
Totals	5	1448.9	100	254.0	100	366.6	100	7	2069.5	100

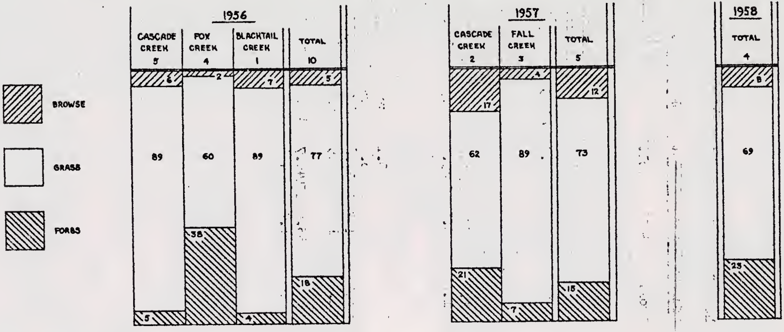
Table VI. Domestic Sheep - Gravelly Mountains - 1959.

	July 1959 7 Spec.			Aug. 1959 2 Spec.			Sept. 1959 8 Spec.			Total 1959 17 Spec.		
		Freq.			Freq.			Freq.			Freq.	
	Vol. %	No.	%	Vol. %	No.	%	Vol. %	No.	%	Vol. %	No.	%
Unident. conifer	tr	1	14	tr			tr	1	13	tr	2	12
Arctostaphylos uva-ursis							tr	1	13	tr	1	6
Artemisia tridentata							tr	1	13	tr	1	6
Berberis repens	tr	1	14	1.5	1		1.3	4	50	0.7	6	35
Comandra spp.	0.1	1	14							tr	1	6
Gutierrezia sal.							0.6	1	13	0.3	1	6
Populus spp.							tr	1	13	tr	1	6
Rosaceae							0.4	2	25	0.2	2	12
Salix spp.	tr	1	14				1.8	4	50	0.8	5	29
Ribes spp.							0.6	1	13	0.3	1	6
Symphoricarpos spp.	1.6	1	14				5.7	5	63	3.3	6	35
Unident. browse	0.5	3	43	1.1	1		1.4	4	50	0.9	8	47
Browse total.	2.2			2.6			11.9			6.5		
Total Browse.	2.2			2.6			11.9			6.5		
Achillea spp.							tr	2	25	tr	2	12
Antennaria spp.	tr	1	14				tr	1	13	tr	2	12
Artemisia ludoviciana							1.4	1	13	0.6	1	6
Aster spp.							0.2	1	13	0.1	1	6
Compositae							0.3	1	13	0.1	1	6
Eriogonium spp.	2.2	2	29	5.9	1		4.5	3	38	3.5	6	35
Leguminosae	tr	1	14							tr	1	6
Lupinus spp.				0.6	1		8.3	6	75	3.7	6	35
Polygonum spp.							1.2	1	13	0.5	1	6
Potentilla spp.	0.6	3	43	12.6	2		11.2	5	63	6.2	10	59
Taraxacum spp.	0.1	1	14							0.1	1	6
Trifolium spp.	0.5	1	14							0.2	1	6
Unident. forbs	24.4	6	86	11.2	2		5.2	7	88	14.9	15	88
Total Forbs.	28.0			30.5			32.3			30.1		
Gramineae	37.4	5	71				41.3	5	63	36.5	10	59
Juncaceae	tr	2	29	66.9	2		14.6	3	38	26.8	7	41
Total Grass-Like.	69.8			66.9			55.8			63.4		

Table VII. Summarization 1960 Domestic Sheep Data.

	Basin Creek			Eureka Basin		West Creek		Totals		
Species	freq.	cc vol.	%	vol.	%	vol.	%	freq.	vol.	%
Forbs:										
Achillea	1	0.6	tr	-		-		1	0.6	tr
Compositae	2	2.7	tr	-		-		2	2.7	tr
Commandra	-			-		26.0	7.3	1	26.0	2.7
Leguminosae	2	12.1	3.1	-		-		2	15.1	1.6
Lupinus	1	5.0	1.0	-		-		1	5.0	tr
Potentilla	2	11.6	2.0	-		-		2	11.6	1.0
Umbelliferae	1	5.0	1.0	-		-		1	5.0	tr
Unident. forbs	2	235.1	49.6	71.2	63.3	143.8	40.6	4	450.1	47.8
Totals		275.1	58.1	71.2	63.3	169.8	47.9	4	516.1	54.8
Browse:										
Rosa	-			-		0.1	tr	1	0.1	tr
Symphoricarpos	-			-		8.0	2.3	1	8.0	tr
Unident.	2	28.4	6.0	1.4	1.2	31.8	8.9	4	61.6	6.5
Totals	2	28.4	6.0	1.4	1.2	39.9	11.3	4	69.7	7.4
Grass Totals.		176.1	35.9	39.8	35.4	144.7	40.8	4	354.6	37.7
Sample Totals.		473.6	50.4	112.4	11.9	354.9	31.2	4	940.4	100

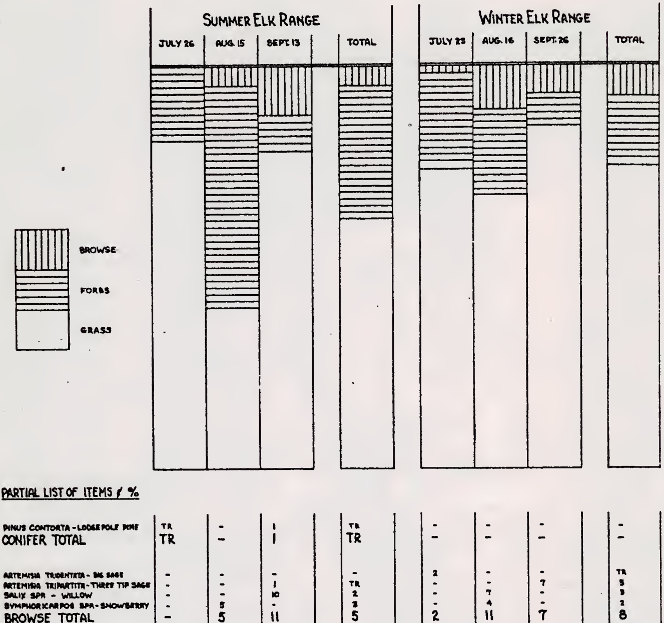
FIGURE I. ANALYSIS OF ELK RUMEN SAMPLES COLLECTED FROM THE GRAVELLY MOUNTAINS STUDY AREA DURING THE 1956, 1957 AND 1958 HUNTING SEASONS.



PARTIAL LIST OF ITEMS & %

	1956				1957			1958
	CASCADE CREEK 5	FOX CREEK 4	BLACKTAIL CREEK 1	TOTAL 10	CASCADE CREEK 2	FALL CREEK 3	TOTAL 5	TOTAL 4
	OCTOBER 15-18				OCTOBER 20-21			OCT. 19-30
PINUS FLEXIS – LIMBER PINE	1	TR	1	1	1	1	1	TR
CONIFER TOTAL	1	TR	1	1	1	1	1	TR
MAHONIA REPENS – OREGON GRAPE	4	1	–	3	14	3	10	TR
SALIX SPP. – WILLOW	TR	TR	–	TR	–	–	–	4
VACCINIUM SPP. – HUCKLEBERRY	–	–	5	TR	–	–	–	3
UNIDENT. BROWSE – BARE STEMS, BARK	1	1	1	1	1	–	1	1
BROWSE TOTAL	5	2	6	4	16	3	11	8
TOTAL BROWSE (CONIFER/BROWSE)	6	2	7	5	17	4	12	8
ACHILLEA SPP. – YARROW	TR	1	TR	1	TR	TR	TR	1
ANTENNARIA SPP. – PUSSYTOES	1	–	–	1	TR	–	TR	TR
ASTER SPP. – ASTER	TR	1	2	TR	9	2	6	1
CIRSIUM SPP. – THISTLE	–	–	–	–	1	–	TR	5
COMPOSITAE – COMPOSITE FAMILY	–	2	2	1	–	–	–	–
LUPINUS SPP. – LUPINE	–	–	–	–	1	–	1	16
PHLOX SPP. – PHLOX	1	–	–	TR	1	1	1	–
WYETHIA SPP. – WYETHIA	–	21	–	12	–	–	–	–
UNIDENT. FORB – LEAVES, STEMS	3	3	–	3	9	4	7	TR
TOTAL FORB	5	38	4	18	21	7	15	23
CYPERACEAE – SEDGE FAMILY	1	TR	–	TR	1	–	1	–
GRAMINEAE – GRASS FAMILY	88	60	89	77	61	89	72	69
TOTAL GRASS-LIKE PLANTS	89	60	89	77	62	89	73	69

FIGURE II ANALYSIS OF SIX DOMESTIC SHEEP RUMEN SAMPLES COLLECTED DURING 1957 FROM THE GRAVELLY MOUNTAINS ELK STUDY AREA.



PARTIAL LIST OF ITEMS / %

PINUS CONTORTA - LODGEPOLE PINE	TR	-	1	TR	-	-	-	-
CONIFER TOTAL	TR	-	1	TR	-	-	-	-
ARTEMISIA TRIDENTATA - BIG SAGE	-	-	-	-	2	-	-	TR
ARTEMISIA TRIPARTITA - THREE TIP SAGE	-	-	1	TR	-	-	7	3
SALIX SPP. - WILLOW	-	-	10	2	-	7	-	3
SYMPHORICARPOS SPP. - SNOWBERRY	-	5	-	3	-	4	-	2
BROWSE TOTAL	-	5	11	5	2	11	7	8
TOTAL BROWSE (CONIFER + BROWSE)	TR	5	12	5	2	11	7	8
ANTENNARIA SPP. - PUSSYTOES	-	-	-	-	5	-	8	4
ASTER SPP. - ASTER	4	3	1	3	1	2	-	1
ERIGONUM SPP. - ERIGONUM	-	9	1	4	6	4	-	3
GERANIUM SPP. - GERANIUM	4	31	1	18	2	1	-	1
LOMATIUM SPP. - LOMATIUM	TR	5	-	2	-	-	-	-
POTENTILLA SPP. - CINQUEFOIL	2	-	-	1	-	1	-	TR
TRIFOLIUM SPP. - CLOVER	6	-	-	2	-	-	-	-
WYETHIA SPP. - WYETHIA	-	-	-	-	-	7	-	3
UNIDENT. FORB - LEAVES	2	7	6	5	8	6	TR	4
TOTAL FORBS	18	55	9	33	24	21	8	17
TOTAL GRASS	82	40	79	62	74	68	85	75

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1965

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JOB COMPLETION REPORT

INVESTIGATIONS PROJECT

State of Montana

Project No.: W-73-R-9-10

Name: Wildlife Investigations - Dist. 3

Job No.: A-1

Title: Big Game Survey and Investigations-Antelope, Bighorn Sheep, Mountain Goat and Moose.

Period Covered: July 1, 1963 to June 30, 1965

Abstract:

For the years 1962, 1963 and 1964, there were 2,921, 3,267 and 4,160 antelope permits issued, respectively. Hunters harvested 2,250 antelope in 1962, 2,456 in 1963 and 2,908 in 1964. Hunter success for the 3 years was 83, 83, and 73, respectively. Population trends based on aerial surveys indicate increases in antelope numbers in Areas 31, 33, and 339, a decrease in Area 340 and no change in Area 30. Three hundred fifty-five antelope were trapped and tagged in Idaho in January of 1962. During the summers of 1962, 1963 and 1964, 92, 43 and 13, respectively of these tagged antelope were observed in Montana. Measurements were made on low sagebrush (*Artemisia arbuscula*) in Sage and Basin Creeks. This area is an important wintering area for antelope which summer in the Centennial Valley. The area also is used by sage grouse, mule deer, sheep and cattle. The sage brush is presently over-used.

In 1961 hunters harvested 45 mountain goats, in 1962, 53 were harvested, 53 again in 1963 and 64 in 1964. Hunter success for those years ranged (by area) from 100% to 33%. Twenty-three, 36 and 24 mountain sheep were harvested during 1962, 1963 and 1964, respectively. Hunter success for those 3 years was 8.4%, 9.0% and 8.7%.

Moose permits available each year have decreased from 505 in 1962 to 345 in 1964. Moose harvested during 1962, 1963 and 1964 were 369, 316 and 232, respectively. Hunter success in 1962 was 75.3%, 70.7% in 1963 and 70.1% in 1964. Adults constituted about 89% of the 1964 harvest. Numbers of residents and non-residents applying for and receiving permits were presented.

Limited information is presented on bear harvests and observations.

Objectives:

To obtain quantitative data for the management of big game populations. Data will be from range surveys, population trend surveys, hunter surveys and supplemental studies. Results of surveys and investigations will be presented by management units. Management units are at present defined as the district management units described on the hunter map.

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Procedures: 1. Range Surveys.

   a. Range surveys will be conducted according to standardized procedures described in the Department's Range Survey Guide.

   b. Supplemental range surveys, using other than the Department's standard procedures, may also be conducted where needed.

2. Population Trend Surveys.

   a. Trends in population size will be determined by methods applicable to species.

   b. Trends in population productivity and rates of increase will be determined from herd composition data.

   c. Trends in population mortality will be determined by appropriately spaced adult-young ratio counts or dead animal counts on sample plots.

3. Hunter Harvest Surveys.

   a. A statewide questionnaire will be used to determine the hunter success and numbers of animals harvested on a statewide, district and management unit basis.

   b. Checking stations will be used where supplemental harvest information and biological data are desired.

4. Supplemental Studies.

   a. Food habits and forage preferences will be investigated by feeding site examinations and/or rumen analyses. Rumen analysis will be conducted by the State Fish and Game Laboratory.

   b. Movements within home ranges and migratory habits will be investigated by the use of marked and/or tagged animals.

   c. Relationships to domestic livestock or agricultural crops will be investigated by methods applicable to the situation.

Findings:

ANTELOPE

Aerial antelope surveys were conducted in hunting Areas 30, 34, 320 and 339 during July and August of 1963 and in Areas 30, 31, 33, 339 and 340 during January, July and August of 1964. Survey data are presented in Tables 1 and 2. The information indicates antelope populations in Areas 31, 33 and 339 increased when compared to previous surveys. The population appeared to decrease in Area 340 and is unchanged or increased only slightly in Area 30. Areas 34 and 320 (with present boundaries) were not surveyed prior to 1963.

Antelope populations in Areas 30 and 31 are influenced by seasonal movements of antelope between Idaho and Montana - wintering in Idaho and summering in Montana. Idaho trapped and tagged 355 animals during January, 1962, of which 92, 43, and 13 were observed in Montana during the summers of 1962, 1963 and 1964, respectively. General location of these observations are found in Table 3. Because of this seasonal movement out of the state, an opening date early in September was initiated.

Fawn:doe ratios for the areas surveyed varied from 54 to 105 fawns per 100 does.

Antelope harvest information was obtained from questionnaires (Tables 4 and 5). There were 3,267 and 4,160 permits issued in 1963 and 1964 as compared to 2,921 in 1962. The hunter success of 73 percent for 1964 was less than the 83 percent success recorded for both 1962 and 1963. Hunter harvest increased during 1963 and 1964 as compared to 1962 with 2,250, 2,456 and 2,908 antelope killed during the 1962, 1963 and 1964 seasons, respectively.

A summary of aerial survey and harvest information for the years 1960-1964 is presented in Table 6. During this period, permit numbers were increased from 1,376 to 4,160; hunter harvest has increased from 1,121 to 2,908; and hunter success decreased from 89 to 73 percent.

Information from four transects on low sagebrush (*Artemisia arbuscula*) was obtained in the spring of 1964. These transects are located on Basin Creek in Area 33, an important wintering area for antelope, sage grouse and deer. This area is also used by cattle during summer and by domestic sheep during spring, late fall and winter. The plants along these transects averaged 60 percent use in 1964. Average percent of dead crown was 31 percent with 55 percent of the plants classified as decadent. Summaries from these transects, since 1961 are found in Table 7. No information was obtained from these transects in 1965.

The Red Rocks Refuge in Area 33 usually has a substantial number of antelope until late in the fall when they move towards the west end of the Centennial Valley, the majority of them wintering on Sage and Basin Creeks. To allow most of the antelope to leave the refuge prior to the hunting season, an opening date in late October was initiated during the 1963 season. During an aerial flight on September 5, 1963, 1,245 antelope were observed on the refuge and in an adjacent area within 2 miles of its boundaries. During a similar flight on October 24, 520 were counted in the same area. This indicates a late opening date is desirable. Also, beginning with the 1963 season, a portion of the Red Rocks Refuge was opened to antelope hunting.

TABLE 1. ANTELOPE SURVEYS OF HUNTING AREAS 30, 34, 320 AND 399 DURING JULY AND AUGUST OF 1963.

	Number of Antelope Observed					M:	Fawns:	Fawns:
Location	M	F	Fawns	UNC	Total	100 F	100 F	100 Ad.
Area 30[1/]								
Big Sheep Basin	57	134	106		297			
Medicine Lodge	27	108	66	4	205			
Horse Prairie	104	206	143	—	453			
Total	188	448	315	4	955	42:100	70:100	49:100
Area 34								
N. of Big Hole River	16	49	20		85			
S. of Big Hole River	46	75	47		168			
SW. of Whitehall				—	21			
Total	62	124	67		274	50:100	54:100	36:100
Area 320								
Ennis-Boulder River-Sheridan	9	19	25		53			
Sheridan-Whitehall	42	58	34	2	136			
Total	51	77	59	2	189	66:100	77:100	46:100
Area 339								
E. of Shields River-Duck Creek	93	140	140		373			
W. of Shields River-Flathead Creek S.	1	14	16		31			
Wilsall-Ringling W. of Highway	19	90	86		195			
Wilsall-Ringling E. of Highway-Shields	48	161	179		388			
Gallatin Valley-Horseshoe	4	20	17	—	41			
Total	146	335	352		833	44:100	105:100	73:100

1/ Only partial survey -- area from Armstead to Monida not included. Figure for area surveyed was comparable to 1962 figure for the same area (1,069).

TABLE 2. ANTELOPE SURVEYS OF HUNTING AREAS 30, 31, 33, 339 AND 340 DURING JANUARY, JULY AND AUGUST OF 1964.

	Number of Antelope Observed					M:	Fawns:	Fawns:
Location	M	F	Fawns	UNC	Total	100 F	100 F	100 Ad.
Area 30								
Big Sheep Basin					308			
Armstead-Lima					270			
Medicine Lodge					172			
Horse Prairie					493			
Lima-Monida					553			
Total					1,796			
Area 31								
Birch Creek-Rattlesnake Creek					139			
Birch Creek-Melrose					13			
Rattlesnake Creek-Highway 298-Badger Pass					86			
Grasshopper Creek					349			
Horse Prairie					925			
Total					1,512			
Area 33 1/								
Armstead-Dell					124			
Sage Creek					2,104			
Basin Creek					245			
Dillon S. - W. of Rock Island					66			
Dell-Lima Dam - N. of Red Rock R.					146			
Lima-Monida-Long Creek - S. of Red Rock R.					150			
No. of Lima Reservoir					400			
Blacktail above Rock Island					247			
Airport-Beaverhead-Rock					64			
Total					3,546			
Area 339 2/								
Duck Creek Vicinity	165	227	203	64	659			
Flathead Creek N.	56	132	113	4	305			
W. of Shields River	6	53	48	1	108			
Total	227	412	364	69	1,072	55:100	88:100	57:100

1/ January survey. Not a complete survey of the unit, but all significant concentrations are included. Does not include fawn crop.

2/ A portion of 339 was transferred to 311 prior to the 1964 census.

TABLE 3. GENERAL LOCATIONS OF TAGGED IDAHO ANTELOPE OBSERVED IN MONTANA DURING THE SUMMERS OF 1962, 1963 and 1964. 1/

Location	Tagged Antelope Observed		
	1962	1963	1964
Sheep Creek	51	26	10
Medicine Lodge	23	5	2
Horse Prairie	18	12	1
Total	92	43	13

1/ A total of 355 animals were tagged in Idaho during January, 1962.

TABLE 4. 1963 ANTELOPE HARVEST INFORMATION FROM HUNTER QUESTIONNAIRES IN DISTRICT 3,

Area	Permits	Hunter	Percent Success	Number Days	Kill
30	601	552	79	1.7	437
31	250	244	73	2.1	179
33	1,500	1,293	81	1.4	1,045
34	30	27	85	1.3	23
36	201	189	71	1.8	134
37	150	150	88	1.3	132
38	75	68	93	1.6	63
311	40	38	97	1.3	37
320	75	70	84	2.1	59
339	200	174	94	1.6	164
340	125	125	96	1.4	120
350	20	18	44	1.9	8
Totals	3,267	2,961	83	1.6	2,456

TABLE 5. 1964 ANTELOPE HARVEST INFORMATION FROM HUNTER QUESTIONNAIRES IN DISTRICT 3.

Area	Permits	Hunters	Percent Success	Number Days	Kill
30	601	582	78	1.6	456
31	353	332	78	1.9	259
33	2,001	1,739	73	2.2	1,278
34	31	29	79	1.9	23
36	258	230	80	2.1	185
37	200	200	63	2.2	125
38	75	73	85	1.4	62
311	80	80	86	1.5	69
320	100	96	75	1.9	72
339	301	290	88	1.4	256
340	150	142	76	1.8	108
350	20	18	83	3.3	15
Totals	4,160	3,980	73	1.7	2,908

TABLE 6. ANTELOPE SURVEY AND HUNTING SEASON INFORMATION FOR THE YEARS 1960-1964 BY HUNTING AREA.

Hunting	Years				
Area	1960	1961	1962	1963	1964
30				1/	
Census		1,912	1,634	955	1,796
Permits	200	604	601	601	601
Percent success*	87	85	85	79	78
Kill	169	460	477	437	456
31					
Census			938		1,512
Permits	150	149	250	250	353
Percent success	90	81	72	73	78
Kill	117	110	167	179	259
2/ 33					
Census		1,935	2,694		3,546
Permits	501	901	1,201	1,500	2,000
Percent success	93	79	82	81	73
Kill	422	622	866	1,045	1,278

TABLE 6. (CONTINUED)

Hunting Area	1960	1961	1962	1963	1964
34					
Census				274	
Permits	30	30	30	30	31
Percent success	80	80	88	85	79
Kill	24	24	26	23	23
36					
Census		466			
Permits	77	200	201	201	258
Percent success	92	82	76	71	80
Kill	66	159	138	134	185
37[3/]					
Census			514		
Permits			150	150	200
Percent success			91	88	63
Kill			137	132	125
38					
Census			298		
Permits	51	75	77	75	75
Percent success	90	93	94	93	85
Kill	46	65	69	63	62
39[4/]					
Census					
Permits	28	25			
Percent success	67	100			
Kill	11	19			
311					
Census		192			
Permits	40	40	40	40	80
Percent success	100	72	89	97	86
Kill	35	29	35	37	69
320					
Census				189[5/]	
Permits	61	61	75	75	100
Percent success	82	82	76	84	75
Kill	50	46	54	59	72
339					
Census				833	1,072[6/]
Permits	152	153	151	200	301
Percent success	85	89	92	94	88
Kill	125	123	134	164	256
340					
Census	300		453		298
Permits	36	125	125	125	150
Percent success	100	96	90	96	76
Kill	31	115	113	120	108

TABLE 6. (CONTINUED)

Hunting Area	Years 1960	1961	1962	1963	1964
350					
Census		211	72[7]		
Permits	50	25	20	20	20
Percent success	62	100	47	44	83
Kill	25	25	9	8	15
Totals					
Permits	1,376	2,388	2,921	3,267	4,160
Percent success	89	83	83	83	73
Kill	1,121	1,797	2,250	2,456	2,908

* Based on number of permits issued. Success of hunters actually hunting is higher.

1/ Partial survey -- area from Armstead to Monida not included. Figure for area censused was comparable to 1962 figure for the same area (1,069).

2/ Winter surveys - figures do not include fawn crops.

3/ Area 37 was initiated in 1962 from a part of Area 38.

4/ Area 39 was discontinued in 1962 and was made a part of Area 38.

5/ West half only.

6/ Part of 339 transferred to 311.

7/ Only Whitetail Creek area - figure is comparable to 1961 census for the same area (80).

TABLE 7. SUMMARY OF BROWSE TRANSECTS ON BASIN CREEK IN AREA 33.[1]

Plot	Year[2]	Species	Number Plants	Percent Form Class 2	Percent Form Class 3	Percent Age Class M	Percent Age Class D	Percent Use	Percent Crown Dead
242	1961	ARAR	50		100	38	62	76	33
	1963		110		100	42	58	62	-
	1964		50	2	98	40	60	64	35
243	1961	ARAR	50		100	18	82	76	42
	1963		25		100	64	36	57	-
	1964		50	2	98	48	52	60	31
245	1961	ARAR	50		100	58	42	72	23
	1963		50		100	80	20	77	-
	1964		50		100	32	68	70	30
246	1961	ARAR	50		100	58	42	69	23
	1963		50		100	36	64	53	-
	1964		50	4	96	60	40	47	26
30	1961	ARAR	50		100	62	38	76	24
	1963		50		100	90	10	68	-
	1964			No Data					

1/ Transects are on *Artemisia arbuscula* and were "read" in the spring of each year.

2/ Transects were not "read" in 1962 or 1965.

MOUNTAIN GOATS

Population surveys on mountain goats were minimal during the report period. Table 8 presents information obtained from aerial surveys of goats.

For the 1963 season, there were 2,016 applications for the state's 493 mountain goat permits in the limited quota areas. Three hundred sixty-eight of these applicants were non-residents and 1,648 were residents. In District 3, there were 140 permits available with 159 non-resident and 653 resident applications for these permits. The number of non-residents who actually received a permit in 1963 was 14, and for residents, 126. Table 9 shows that 114 of the 140 permit holders actually hunted.

The number of applicants for the mountain goat season of 1964 consisted of 1,966, statewide, for 518 permits in the limited quota areas. In District 3, where the number of hunting areas had been increased from three to five with 155 permits available, there were 190 non-resident and 617 resident applicants. Fifteen of the non-residents got permits, while 140 of the residents got permits. Of the 155 permit holders, 132 of these people actually hunted. Table 9 indicates 64 mountain goats were harvested by the 132 hunters.

During the 1963 goat season, three tagged animals were shot by hunters. A resume of these returns follows:

Tag Numbers	Sex	Age*	Date Killed	Location	Date Tagged	Location
H-0223 H-0241	?	?	Sept. 1963	Crazy Mtns.	9/31/60	Hindu Lake
H-0243 (Left) H-0245 (Right)	F	6 years	Sept. 1963	Cottonwood Creek Crazy Mtns.	7/18/61	Hindu Lake
791	-	Ad. + 3 years	Oct. 2, 1963	Tahepia Lake Pioneer Mtns.	7/9/60	Canyon Cr. Pioneers

* At time of kill.

An area in Canyon Creek in the Pioneer range (mountain goat hunting Area 312) has been set aside as a closed area. In this area, near the Lime Kilns, goats can frequently be observed from the road. It is felt the recreational benefits of observation are as important as hunting.

TABLE 8. MOUNTAIN GOAT OBSERVATIONS - DISTRICT 3.

	Number			LOCATION		
Date	M	F	K	Elevation	Drainage	Site
9/19/62		1	1	10,200	No Man	Taylor Peaks
9/20/62	2	1	1	9,600	Taylor Fork	Taylor Peaks
9/21/62	1	3	4	10,000	Taylor Fork	Taylor Peaks
9/22/62	2(unclass.)			9,800	Taylor Fork	Taylor Peaks
9/23/62	1		2	10,200	Indian Creek	Taylor Peaks
10/4/63	12 adults 4 kids			8,500-10,500	Spanish Creek West Fork	Spanish Peaks Lone Mountain
10/8/64	2 22(unclass.)		12	-	-	Pioneer Mtns. (Tent, Highboy, Saddleback, Tweedy Mountains) 7 of the 36 were along Barbour Hill.
10/64	15 adults 2 yearlings 1 young			-	Mill Creek (Yellowstone)	-
10/12/64	22(unclass.)			-	-	Tobacco Roots
8/64	11(unclass.)			-	-	Tobacco Roots
5/21/63	6 (5 ads. - 1 young)			-	Canyon Creek	Pioneer Mtns.
8/20/63	1			-	Canyon Creek	Pioneer Mtns.
4/20/64	2			-	Canyon Creek	Pioneer Mtns.
6/24/64	4			-	Canyon Creek	Pioneer Mtns.

TABLE 9. MOUNTAIN GOAT HARVEST DATA. (POSTAL QUESTIONNAIRE). FOR YEARS 1961-1964 - DISTRICT 3.

Area	1961	1962	1963	1964
312				
No. Permits	30	30	30	30
No. Hunters Hunting	21	27	26	27
Percent Success	47.6	39.1	46.2	48.1
Total Killed	10	10	12	13
Percent Hampered by Weather	-	25	65	25
313				
No. Permits	100	100	100	100
No. Hunters Hunting	69	74	79	84
Percent Success	35.0	46.8	48.0	44.0
Total Killed	24	35	38	37
Percent Hampered by Weather	-	36	48	43
322				
No. Permits	-	10	10	10
No. Hunters Hunting	-	10	9	8
Percent Success	-	83.3	33.3	50.0
Total Killed	-	8	3	4
Percent Hampered by Weather	-	20	60	43

TABLE 9. (CONTINUED)

Area	1961	1962	1963	1964
323				
No. Permits		Area not formed until 1964		10
No. Hunters Hunting				9
Percent Success				66.7
Total Killed				6
Percent Hampered by Weather				62
324				
No. Permits		Area not formed until 1964		5
No. Hunters Hunting				4
Percent Success				100.0
Total Killed				4
Percent Hampered by Weather				50

MOUNTAIN SHEEP

Sheep occur in several localities within this district. Those from the Spanish Peaks area can frequently be observed on the Dudly-Hellroaring Creek slopes in winter and during December 1964, approximately 100 sheep were observed during an elk survey. Two rams that appeared to be in the full curl category were observed at that time. Groups of sheep numbering between 13 and 30 were observed in connection with elk surveys conducted in the Upper Gallatin during the winters of 1963-64 and 1964-65. Other observations on mountain sheep appear in Table 10.

Only one sheep hunting area occurs in District 3. This is a large area and extends from the eastern boundary of the district to the Madison River in the mountainous area south of the Norris-Big Timber Road. The area is designated as Area 301 - Gallatin-Absoroka, and there is no limit on the number of permits issued. A companion area lies to the east and is continuous with 301. Permits are available at license dealers, District Headquarters and the Helena office. The 1963 and 1964 applications appear in Table 11. Computation of the 1963 and 1964 harvest data from the two areas was not separated, hence information is available for the combined Area 301 and 301.1 only. Harvest information for 1962, 1963 and 1964 is given in Table 12.

On March 24, 1964, 25 mountain sheep were planted on Willow Creek, near Pony, Montana. Snow conditions evidently prevented the truck driving any great distance into the prescribed release area, and the release was made at a considerably lower elevation than intended. The sheep did not move up into the rougher terrain, but remained at lower elevations and even frequented domestic stock feeding areas. At least one complaint was received from a landowner concerning the sheep associating with his feed lot. Information pertinent to this release is given in Table 13.

TABLE 10. MOUNTAIN SHEEP OBSERVATIONS - DISTRICT 3.

Date	Number	Location
1961		
February 6	19	Bad Luck Creek - Madison River
February 7	8	Hadley Park - Bull Mountains
1963		
January 4	30	West Targhee-Watkins Creek Ridge & Watkins-Sheep Creek Ridge - Madison River
January 26	30 (6 M, 18 F, 6 Lambs)	(SW¼ 19, T 10S - R 1E) Squaw Creek-Bighorn Area-Madison R.
1964		
October	7 (4 adults - 3 young)	Mill Creek-Absoroka-Yellowstone River

TABLE 11. AREA 301-301.1 -- MOUNTAIN SHEEP PERMIT APPLICATIONS - DISTRICT 3.

Year	Area	Non-Resident Applications	Resident Applications	Total	Quota
1963	301	114	84	198	Unlimited
	301.1*	17	55	72	Unlimited
		131	139	270	
1964	301-302*	187	212	399	Unlimited

* Companion area in District 5. Same areas.

TABLE 12. MOUNTAIN SHEEP HARVEST - AREA 301-301.1 - DISTRICT 3.

Year	Permits	Number Hunters	Success*	Kill	Hampered by Weather
1962	361	271	8.4	23	-
1963	518	400	9.0	36	46.7
1964	399	277	8.7	24	20.7

* Based on hunters actually hunting.

TABLE 13. WILLOW CREEK MOUNTAIN SHEEP TRANSPLANT - DISTRICT 3.

Tag No.	Sex	Age	Area Trapped	Release Area	Date
H-3498	M	Lamb	Hannan Gulch	Willow Cr.-Madison Co.	3/24/64
H-3499	F	Lamb	"	(near Pony)	"
F-245	M	Lamb	"	"	"
J-104	F	Mature	"	"	"
J-105	F	Mature	"	"	"
J-232	F	Mature	"	"	"
J-066	F	Mature	"	"	"
J-234	M	2 Year	"	"	"
H-3480	F	Mature	"	"	"
H-3483	F	Mature	"	"	"
H-3482	M	1 Year	"	"	"
H-3484	F	Mature	"	"	"
H-3485	F	Mature	"	"	"
H-3486	F	Mature	"	"	"
H-3487	F	Lamb	"	"	"
H-3488	F	Mature	"	"	"
H-3489	M	Lamb	"	"	"
H-3490	F	Mature	"	"	"
H-3491	F	Lamb	"	"	"
H-3492	F	Mature	"	"	"
H-3493	F	Lamb	"	"	"
H-3494	F	Mature	"	"	"
H-3495	M	Lamb	"	"	"
H-3496	F	Lamb	"	"	"
H-3497	F	Mature	"	"	"

MOOSE

Investigations on range, population, distribution and harvest are reported in more detail under Project W-98-R-5, Job B-13, entitled "Moose Population and Forage Inventories in Southwestern Montana" covering the period January 4, 1965 through June 30, 1965.

That report as well as those in the future will bring the moose projects up-to-date. Current and future investigations of moose in District 3 will be coordinated between Projects 73-R- and 98-R.

The demand for moose permits (Table 14) usually exceeds the available quota. In 1963 there were 3,141 applications for the 465 permits. About 26 percent of these applications were from non-residents. In 1964 about 34 percent of the 3,339 applications were from non-residents. In 1963, 11 percent of the permits actually issued went to non-residents and in 1964, 8.5 percent went to non-residents.

Tables 15 and 16 present harvest data for the 1963 and 1964 moose seasons in District 3. Table 17 presents a summary of moose harvests for 1962, 1963, and 1964. The variations in hunter success may be as much a function of moose distribution and hunter effort as of moose density.

Table 18 presents a resume of moose hunting in District 3 since 1945. Prior to 1945 moose seasons were closed for many years. The areas marked with an asterisk are not within the present boundaries of Fish and Game, District 3.

BEAR

Table 19 presents harvest data for the years 1963-1964. Differences in sampling procedures between 1963 and 1964 is apparent in the point estimate (95 percent confidence interval) of hunters. Estimates of harvests for the 2 years should be used as trends only. The harvest of grizzly bears determined from the postal questionnaire is questionable for both years.

Observations of bear were obtained by Department and Forest Service personnel and are presented in Table 20, for the period July 20 to August 31, 1964.

It is assumed that few hunters actually go hunting specifically for bear, and most bear are harvested incidental to hunting other big game. During the 1965 State legislative assembly, authorization was given the Department to issue $20 non-resident bear licenses. Black bear seasons commence in the spring (mid-March) and close at the end of the regular big game season (late November). The season dates for grizzly bear correspond to those established for the general elk and deer season.

Submitted by: Joseph L. Egan Approved by: Wynn G. Freeman

Date: June, 1966

TABLE 14. MOOSE PERMIT INFORMATION, 1963-1964 - DISTRICT 3.

Area	Name	Quota		Permit Applications				Permits Issued			
		1963	1964	NR		Res.		NR		Res.	
				1963	1964	1963	1964	1963	1964	1963	1964
31	Pioneer-Horse Prairie	20	20	19	107	101	113	2	2	18	18
32	Big Hole (East)	60	10	139	48	615	134	6	1	54	9
32.1	West Big Hole	X	20	X	179	X	367	X	2	X	18
33.1	Gravelly	50	25	125	121	145	143	5	2	45	23
33.2	Ruby River	50	25	111	127	277	214	5	1	45	24
33.3	Blacktail Creek	30	15	31	21	52	51	5	1	25	14
33.4	Red Rock	30	15	20	21	43	22	3	1	27	14
35	Whitetail	5	5	1	0	23	32	0	0	5	5
36	East Madison	30	15	9	30	23	13	7	2	23	13
310	Upper Gallatin	60	60	166	215	256	307	6	6	54	54
311	Lower Gallatin	50	50	61	109	438	463	5	5	45	45
314	Upper Yellowstone	10	15	22	22	105	117	1	1	9	14
316.1	Hellroaring	10	10	21	28	13	9	1	1	9	9
316.2	Buffalo Fork	10	10	27	25	8	11	2	1	8	9
316.3	Slough Creek	10	10	36	41	30	21	1	1	9	9
316.4	Cooke City	15	15	2	18	108	86	0	1	15	14
319	Fleecer-Highrye	5	5	0	0	21	25	0	0	5	5
320	Tobacco Root	10	10	8	1	25	33	1	0	9	10
361	Hebgen-Upper Madison	10	10	7	16	53	49	1	1	9	9
	Totals	465	345	805	1,129	2,336	2,210	51	29	414	316

X No Area.

TABLE 15. MOOSE HARVEST INFORMATION, 1963 - DISTRICT 3.

	Hunters		Percent	Harvest				
Area	Point	Range*	Success	Point	Range*	Adults	Calves	Unknown
31	17	15-17	70.6	12	11-13	11	1	0
32	60	56-60	86.7	52	49-53	38	13	1
32.1			No Area in 1963					
33.1	50	42-50	58	29	24-32	21	7	1
33.2	45	42-45	60	27	25-28	22	4	1
33.3	28	24-28	57.1	16	14-18	9	6	1
33.4	30	27-30	70	21	19-22	14	6	1
35	5	5-5	100	5	5-5	5	0	0
36	29	27-29	41.4	12	11-13	9	2	1
310	58	57-58	70.7	41	40-41	34	5	2
311	49	47-49	89.8	44	42-44	41	2	1
314	10	9-10	80	8	7-8	7	0	1
316.1	9	9-9	66.7	6	6-6	6	0	0
316.2	10	10-10	80	8	8-8	5	3	0
316.3	9	9-9	66.7	6	6-6	6	0	0
316.4	14	13-14	71.4	10	9-10	7	2	1
319	5	5-5	80	4	4-4	4	0	0
320	10	8-10	80	8	6-8	5	2	1
361	10	9-10	80	8	7-8	5	2	1
District 1/	447	436-448	70.7	316	295-327	256	58	2

* 95 Percent confidence limits.

1/ Not a total of areas - computation based on total questionnaire sample.

TABLE 16. MOOSE HARVEST INFORMATION, 1964 - DISTRICT 3.

Area	Hunters		Percent Success	Harvest		Adults	Calves	Unknown
	Point	Range*		Point	Range*			
31	20	20-20	60	12	12-12	9	3	0
32	10	8-10	30	3	2-4	2	0	1
321	19	18-19	94.7	18	17-18	16	1	1
33.1	25	23-25	64	16	15-17	15	1	0
33.2	23	18-23	26.1	6	5-10	5	1	0
33.3	15	12-15	86.7	13	10-13	11	1	1
33.4	13	12-13	84.6	11	10-11	7	3	1
35	5	5-5	80	4	4-4	3	1	0
36	13	13-13	61.5	8	8-8	7	1	0
310	59	54-59	62.7	37	32-40	35	1	1
311	47	41-47	87.2	41	36-42	36	4	1
314	15	14-15	73.3	11	10-11	9	1	1
316.1	10	9-10	40	4	4-5	2	2	0
316.2	9	9-9	66.7	6	6-6	5	1	0
316.3	10	10-10	70	7	7-7	7	0	0
316.4	14	12-14	92.9	13	11-13	12	0	1
319	5	4-5	100	5	4-5	5	0	0
320	10	10-10	70	7	7-7	7	0	0
361	10	9-10	100	10	9-10	9	0	1
District 1/	331	321-332	70.1	232	213-243	208	23	1

* 95 Percent confidence limits.

1/ Not a total of areas - computation based on total questionnaire sample.

TABLE 17. MOOSE HARVEST, 1962, 1963, 1964 - DISTRICT 3.

Area	Permits			Harvest			Success 2/		
	1962	1963	1964	1962	1963	1964	1962	1963	1964
31	20	20	20	14	12	12	77.8	70.6	60.0
32	60	60	10	58	52	3	98.1	86.7	30.0
321	X	X	20	X	X	18	X	X	94.7
33.1	60	50	25	36	29	16	64.8	58.0	64.0
33.2	60	50	25	43	27	6	73.7	60.0	26.1
33.3	40	30	15	23	16	13	57.1	57.1	86.7
33.4	40	30	15	22	21	11	60.0	70.0	84.6
35	5	5	5	3	5	4	60.0	100.0	80.0
36	30	30	15	17	12	8	56.0	41.4	61.5
310	60	60	60	40	41	37	67.2	70.7	62.7
311	50	50	50	47	44	41	95.5	89.8	87.2
314	10	10	15	9	8	11	90.0	80.0	73.3
316.1	10	10	10	9	6	4	88.9	66.7	40.0
316.2	10	10	10	9	8	6	87.5	80.0	66.7
316.3	10	10	10	8	6	7	80.0	66.7	70.0
316.4	10	15	15	10	10	13	100.0	71.4	92.9
318	5	X	X	1	X	X	20.0	X	X
319	5	5	5	5	4	5	100.0	80.0	100.0
320	10	10	10	8	8	7	77.8	80.0	70.0
361	10	10	10	9	8	10	100.0	80.0	100.0
District 1/	505	465	345	369	316	232	75.3	70.7	70.1

X No area.

1/ Not area totals - computations based on total questionnaire sample.

2/ Based on hunters actually hunting.

TABLE 18. RESUME OF MOOSE PERMITS ISSUED IN DISTRICT 3 - 1945-1954.

1945

Slough Creek	10 males	Upper Madison	10 males
Buffalo Forks	10 males	West Side Gallatin	10 males
Hellroaring Creek	10 males	East Side Gallatin	10 males
Cooke City	10 males	Bighole-Wise River	20 males

1946

Slough Creek	10 males	7 successful	21 returns 20 successful
Buffalo Forks	10 males	7 successful	
Hellroaring Creek	5 males	4 successful	
Cooke City	5 males	2 successful	
Upper Madison	10 males	5 successful	15 returns 14 successful
West Madison-Gallatin	10 males	6 successful	
East Gallatin	10 males	3 successful	
Bighole	20 males	15 successful	20 returns 19 successful
Bloody Dick	10 males	4 successful	
383 applicants	90 permits	53 successful reported	

1947

Slough Creek	5 males	Bighole-Wise River	20 males
Buffalo Forks	5 males	Bloody Dick	10 males
Hellroaring Creek	5 males	Rock Creek	5 males
Cooke City	5 males	North Fork Flathead	10 males
Upper Madison	10 males		
Upper Gallatin and Tom Miner Basin	20 males	370 applicants	95 permits

1948

Slough Creek	5 males	Rock Creek *	10 males
Buffalo Forks	5 males	Bighole-Wise River	20 males
Hellroaring Creek	5 males	Bloody Dick	10 males
Cooke City	5 males		
Upper Gallatin and Tom Miner Basin	20 males	459 applicants	80 permits

TABLE 18. (CONTINUED)

1949

Bighole-Wise River	Unit #1	25 males	(Lower)
Bighole-Wise River	Unit #2	15 males	(Upper)
Rock Creek (Granite County)*		10 males	
Madison-Gallatin (Upper Gallatin Tom Miner)		20 males	
Slough Creek		3 males	
Buffalo Forks		3 males	
Hellroaring Creek		3 males	
Cooke City		3 males	
551 applicants		82 permits	

Card returns:

34 reported successful
17 unsuccessful (2 did not go hunting)
31 failed to report

1950

Cooke City	3 males
Boulder (Park and Sweet Grass Counties)	5 males
Stillwater	3 males
Gallatin	20 males

Bighole	20 males
Rock Creek*	10 males
Flint Creek Range*	10 males
Ruby	5 males
490 applicants	76 permits

1951

Cooke City	3 males
Boulder	5 males
Upper Gallatin - Tom Miner	20 males
Cherry Creek (Gallatin)	5 males
Bighole	30 males

Grasshopper Creek	7 males
Rock Creek *	10 males
Flint Creek Range *	10 males
Red Rock	5 males
Ravalli - East Side *	5 males
Ravalli - West Side *	5 males
	105 permits

1952

Bighole	60 E.S.
Red Rock	30 E.S.
Horse Prairie	15 E.S.
Lower Madison and Spanish Creek	10 males
Hebgen	3 males
West Fork Madison	5 males
Ruby	15 E.S.
Hellroaring Creek	3 males

Buffalo Fork	3 males
Slough Creek	3 males
Cooke City	3 males
Beartooth Plateau *	5 males
Mill Creek (Park County)	3 males
Shields River	3 males
West Rosebud and Stillwater River*	10 males
Rock Creek *	25 E.S.
Flint Creek Range *	15 E.S.
	211 permits

TABLE 18. (CONTINUED)

1953

Bighole	25 E.S.
Red Rock	20 E.S.
Grasshopper	7 E.S.
Lower Madison - Spanish Creek	10 males
Hebgen	5 E.S.
West Fork Madison	5 E.S.
Ruby	10 E.S.
Hellroaring Creek	3 males
Buffalo Fork	3 males
Slough Creek	3 males
Cooke City	3 males
Beartooth Plateau*	3 males
West Gallatin Area	5 males
Yellowstone	5 males
Stillwater*	5 males
Flint Creek Range *	10 males
Ravalli - West and South Fork Roaring Lion Creek *	10 males
Ravalli - East Side and South Fork Skalkaho Creek*	10 males
	142 permits

1954

Bighole	25 E.S.
Red Rock	25 E.S.
Lower Madison - Spanish Creek	12 males
Hebgen	5 males
West Fork Madison	5 males
Ruby	10 E.S.
Hellroaring Creek	3 males
Buffalo Fork	3 males
Slough Creek	3 males
Cooke City	3 males
Beartooth Plateau *	3 males
Gallatin and Madison (West)	5 males
Yellowstone River	5 males
Stillwater *	5 males
Boulder	5 males
Horse Prairie	15 E.S.
Middle Fork Flathead *	5 males
Logan Creek (Flathead Co.) *	5 males
Rock Creek *	5 males
Flint Creek Range *	10 males
Lincoln Co. (East)*	15 males
Lincoln Co. (West)*	5 males
	182 permits

TABLE 19. BEAR HARVEST, 1963-1964. DISTRICT 3.

Area &	Hunters		Harvest		Percent	Species		
Year	Point	Range	Point	Range	Success	Black	Grzzly.	Unknown
30								
1963	366	233-508	0	-	-	-	-	-
1964	26	10-42	1	0-4	5.7	1	0	0
31								
1963	992	758-1226	0	-	-	-	-	-
1964	158	119-197	6	0-12	3.7	6	0	0
32								
1963	903	680-1127	0	-	-	-	-	-
1964	175	134-216	28	15-41	16.0	26	0	2
33								
1963	1728	1420-2037	17	0-45	1.0	17	0	0
1964	225	179-272	20	9-31	8.8	18	2	0
34								
1963	175	76-274	0	-	-	-	-	-
1964	46	25-67	4	0-9	8.4	4	-	-
35								
1963	319	186-452	0	-	-	-	-	-
1964	90	61-120	6	0-12	6.4	4	2	0
36								
1963	484	320-648	0	-	-	-	-	-
1964	58	35-82	5	0-11	9.1	5	0	0
361								
1963	192	88-295	0	-	-	-	-	-
1964	33	15-50	1	0-4	4.5	1	0	0
37								
1963	121	39-204	0	-	-	-	-	-
1964	15	3-27	0	-	-	-	-	-
38								
1963	353	213-493	15	0-43	4.3	15	0	0
1964	56	33-79	5	0-11	9.6	5	0	0
39								
1963	585	405-765	0	-	-	-	-	-
1964	63	38-87	5	0-11	9.6	5	0	0
310								
1963	840	625-1056	8	0-27	1.0	8	0	0
1964	134	98-169	16	6-25	11.6	16	0	0
311								
1963	1396	1118-1673	69	10-128	4.9	69	0	0
1964	309	255-364	44	27-60	14.1	38	6	0

TABLE 19. (CONTINUED).

Area & Year	Hunters		Harvest		Percent Success	Species		
	Point	Range	Point	Range		Black	Grzzly.	Unknown
312								
1963	1196	939-1453	23	0-59	2.0	23	0	0
1964	113	80-146	4	0-10	3.4	2	2	0
313								
1963	186	84-288	0	-	-	-	-	-
1964	65	40-90	11	3-19	17.0	9	2	0
314								
1963	437	281-593	0	-	-	-	-	-
1964	108	76-141	19	9-30	17.8	19	0	0
315								
1963	274	151-398	15	0-43	5.5	15	0	0
1964	25	10-41	8	1-14	30.7	6	2	0
316								
1963	206	99-313	15	0-39	7.4	15	0	0
1964	132	97-168	14	5-23	10.6	13	1	0
317								
1963	389	242-536	15	0-44	3.9	15	0	0
1964	87	58-116	6	0-12	6.6	6	0	0
318								
1963	374	230-518	0	-	-	-	-	-
1964	45	24-66	3	0-7	6.5	3	0	0
319								
1963	243	127-359	0	-	-	-	-	-
1964	41	21-61	4	0-9	9.4	4	0	0
320								
1963	459	300-619	15	0-43	3.3	15	0	0
1964	113	80-145	9	1-17	8.2	8	1	0
District								
1963	12218	11433-13003	193	95-291	1.6	193	0	0
1964	2119	1978-2260	219	182-257	10.4	198	20	2

TABLE 20. BLACK BEAR OBSERVATIONS, JULY 20 TO AUGUST 31, 1964. DISTRICT 3.

	Location			Bear		
Drainage	Sec.	T.	Rge.	Adults	Cubs	Date
Spring Creek	19	12S	4E	1		July 24
Beaver Creek	21	11S	3E	1		August 4
Cherry Creek	32	12S	4E	1		August 15
Cabin Creek	32	10S	4E	1	3	August 28
Rock Creek	34	3N	11E	1		August 5
Goat Mountain	12	5N	9E	1		August 10
Colley Creek	18	4S	8E	1		August 4
Pine Creek	17	4S	9E	2		August 10
Big Creek	34	6S	6E	1		August 26
Hyalite Creek	26	4S	6E	1		August 27
Indian Creek	25	8S	2E	1		August 12
Little HellRoaring	10	5S	3E	1		August 17
Deep Creek	-	6N	4E	4	2	July-August
Indian Creek	-	7N	1W	2		July-August
Beaver Creek	-	8N	1E	3		July-August
Confederate Gulch	-	10N	2E	2	2	July-August
Cottonwood Creek	-	7N	3E	1		July-August
Miner Lake	9	5S	16W	1	2	July 20
Twin Lakes	10	4S	17W	1		July 25
Grasshopper Creek	29	4S	12W	1		August 3
Billings Creek	29	5S	12W	1		August 8
Twin Lakes	10	5S	12W	1		August 22
Gallatin	33	4S	4E	1		July 20
Hell Roaring	18	5S	4E	1		August 10
Gallatin	23	5S	4E	1		August 30
Logger	36	4S	3E	1		August 27
Tucker Lake	-	9S(?)	12E(?)	1		September 12
Blacktail Canyon	23	2N	7W	1		July 29
Basin Creek	31	1N	7W	2		August 13
China Gulch	6	1N	7W	1		August 22
L. Blacktail Creek	23	2N	7W	1		July 21
L. Basin Creek	21	2N	8W	1		July 22
Blacktail Creek	27	2N	7W	1		July 27
Madison River	35	2S	1E	1		August 25
Meadow Creek	27	2S	7E	1		July 18
W. Fork Madison	23	12S	1W	1		August 13

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STATE DOCUMENTS

Department of Zoology

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT

State of Montana

Name Wildlife Investigation - District Three

Project No. W-73-R-8-9-10-11

Title Big Game Surveys and Investigations - Deer

Job No. A-1

Period Covered July 1, 1962 to June 30, 1966

ABSTRACT:

District Three deer harvests for the years 1962-65 are presented. For the four year period, the harvests ranged from 23,790 (1962) to 13,262 (1965). The decline in deer harvested corresponds to a decline of some 7,900 hunters for the same years. Hunter success in 1962 was approximately 94% and in 1965 it had dropped to about 77%. Information presented indicates non-resident hunters harvested 14% of the total district three harvest for the report period. Sex ratios of the total harvest show male deer are harvested at the rate of two for every female.

Production information indicated an average doe::fawn ratio of approximately 100::39. This low ratio is stated as being a result of the poor winter range condition districtwide.

Considerable information is presented on range conditions and trends throughout the district. With few exceptions, deer winter ranges are in poor or very poor condition. It is stated that present deer hunting seasons and bag limits have not been adequate to halt the deterioration of the ranges. The outlook for these ranges with the present hunting seasons and deer populations is rather bleak.

FINDINGS:

Public acceptance of deer management programs is oriented to the real or imagined number of deer the public assumes is in a given area. However, it is virtually impossible to "count" deer. Distribution patterns (i.e. where deer wintering areas are), and age and sex ratios can be ascertained by aerial and ground surveys but determining actual numbers of deer in these areas is not practical.

The major ingredients of the deer management program in District Three involves a determination of the condition and trend of the deer wintering areas and the productivity of the deer herd. The latter is expressed in terms of fawns per 100 does or per 100 adults. The annual harvest of deer could be considered as an index to the success (or failure) of the management program. This is not necessarily from the standpoint that the more deer harvested the more successful the program, but what kind of deer are being harvested. The number of deer a range will produce depends on the condition of the wintering area. Deer ranges with the wintering area in a deteriorated condition ultimately produce less deer than a range with the wintering area in excellent condition. Herd productivity measures the affect range conditions have on the deer population. Deteriorated range conditions usually result in fewer fawns produced, lowered survival in fawns, smaller antlers, and smaller deer. The major effort therefore, has been directed towards assessment of the condition of the areas where deer winter.

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Harvest

The numbers of deer harvested from 1962-1965 as determined by the postal questionnaire survey is given in Table 1. The use of 95% confidence limits allows a more reliable assessment of whether more or less deer were harvested in a given year than the preceeding year. The over-lap of confidence limits for the years 1962 and 1963 leads to the conclusion that the harvests for those years were approximately the same. Using the total figures (point estimate) at the end of Table 1, there were some 10,000 less deer harvested in 1965 than in 1962. There is also an indication that there were approximately 7,800 less hunters in 1965 than in 1962. The general trend in the number of deer hunters, deer harvested and hunter success from 1962 to 1965 appears to be downward. This downward trend is not necessarily a reflection of less deer but perhaps a function of deer availability. A look at the "hunter units" column in Table 1 indicates in 1962 the hunter units exceeded the number of hunters by about 23% whereas in 1965 hunter units exceeded the number of hunters by 24%. It would appear that hunter effort towards bagging a deer was about the same for the two years. The availability of deer was, of course, not the same for 1962 and 1965. Apparently individual hunters expend the same amount of effort each year regardless of the availability of the deer. During those falls and winters when, because of weather and snow conditions, deer are not concentrated at lower elevations on winter range, hunter success is low. Whereas during hunting seasons when weather conditions concentrate deer at lower elevations, hunter success is high.

Because the hunter's effort remains constant year after year, there is a tendency to interpret the variation in deer distribution as actual increases or decreases in the population. This is not to infer there have been no decreases or increases in the deer population, but year to year distribution patterns seem to be incorrectly interpreted.

TABLE 1. District Three Total Deer Harvest, 1962-1965.

		Hunters		Harvest		Percent	Hunter
Area	Year	Point	Range*	Point	Range*	Success	Units
30	1962	871	-	1129	899-1359	129.6	1271
	1963	1316	1046-1586	1543	1404-1682	117.3	1882
	1964	1322	1212-1433	1501	1444-1559	113.5	1920
	1965	755	575-936	638	530-747	84.6	996
31	1962	2185		1941	1641-2242	88.8	2870
	1963	2382	2019-2744	2071	1863-2279	87.0	3060
	1964	2141	2000-2281	1694	1618-1770	79.1	2746
	1965	1643	1377-1908	1078	921-1236	65.6	2030
32	1962	708	-	411	272-550	58.0	730
	1963	750	546-954	258	165-351	34.4	774
	1964	723	641-805	375	336-415	51.9	799
	1965	758	577-939	221	143-300	29.2	758
33	1962	4641	-	4951	4475-5426	106.7	6634
	1963	4694	4188-5201	5181	4877-5485	110.4	6805
	1964	3978	3787-4168	4014	3912-4116	100.9	5489
	1965	3025	2666-3384	2716	2492-2940	89.8	4123
34	1962	785	-	549	388-710	69.9	828
	1963	539	366-712	288	200-376	53.5	539
	1964	500	432-568	322	290-355	64.4	553
	1965	415	281-549	185	119-252	44.7	415

TABLE 1 - CONTINUED.

		Hunters		Harvest		Percent	Hunter
Area	Year	Point	Range*	Point	Range*	Success	Units
35	1962	575	-	302	183-422	52.6	589
	1963	661	469-852	379	275-483	57.4	706
	1964	625	549-702	273	237-309	43.7	662
	1965	475	332-618	170	106-235	35.9	475
36	1962	162	-	97	29-164	59.7	162
	1963	1151	899-1404	1044	908-1180	90.7	1458
	1964	546	475-617	487	450-524	89.2	705
	1965	397	266-528	258	185-331	65.0	473
37	1962	209	-	129	51-207	61.9	209
	1963	197	92-302	91	38-144	46.2	197
	1964	166	127-205	83	64-102	50.2	170
	1965	77	19-134	38	9-66	49.1	77
38	1962	873	-	695	514-876	79.6	1156
	1963	885	664-1107	436	325-547	49.2	894
	1964	914	822-1006	495	448-541	54.1	987
	1965	928	728-1128	461	350-573	49.7	1071
39	1962	2458	-	2304	1977-2632	93.8	3211
	1963	2001	1668-2333	1918	1717-2119	95.9	2663
	1964	1533	1414-1652	1137	1072-1201	74.2	1866
	1965	1105	887-1323	898	775-1021	81.2	1370
310	1962	553	-	280	165-395	50.7	606
	1963	578	399-757	370	294-445	64.0	586
	1964	277	226-328	135	112-159	48.8	308
	1965	208	113-303	100	52-148	47.9	208
311	1962	1438	-	1401	1145-1657	97.5	1865
	1963	1693	1387-2000	1083	930-1235	63.9	1769
	1964	1436	1321-1551	957	899-1016	66.7	1646
	1965	1347	1106-1587	824	677-971	61.2	1654
312	1962	3791	-	4145	3708-4581	109.3	5359
	1963	3391	2959-3391	3325	3058-3591	98.0	4625
	1964	2631	2476-2787	2427	2334-2519	92.2	3536
	1965	2314	1999-2628	1884	1682-2086	81.4	3061
312.1	1965	79	21-138	50	22-79	63.6	79
313	1962	454	-	504	350-659	111.2	678
	1963	237	122-352	298	253-328	125.2	328
	1964	356	298-413	322	289-355	90.6	465
	1965	154	73-236	113	58-167	73.0	224
314	1962	672	-	651	476-826	96.9	801
	1963	779	571-987	818	703-932	105.0	1047
	1964	807	721-894	856	813-900	106.1	1085
	1965	695	522-868	571	464-678	82.2	903

TABLE 1 - CONTINUED.

		Hunters		Harvest		Percent	Hunter
Area	Year	Point	Range*	Point	Range*	Success	Units
315	1962	978	-	1051	829-1273	107.5	1287
	1963	1005	769-1241	1151	1012-1291	114.5	1455
	1964	961	867-1056	999	952-1047	104.0	1232
	1965	870	676-1064	900	787-1013	103.4	1179
316	1962	117	-	66	10-122	56.7	125
	1963	120	38-202	54	20-88	44.8	120
	1964	164	125-203	74	58-90	45.0	168
	1965	115	44-185	17	0-43	15.1	115
317	1962	1024	-	1254	1012-1254	122.5	1434
	1963	1038	798-1278	1063	923-1203	102.4	1413
	1964	885	794-975	931	878-984	105.2	1235
	1965	614	451-777	614	517-711	100.1	850
318	1962	580	-	215	114-316	37.1	580
	1963	578	399-757	335	243-427	58.0	593
	1964	451	386-515	169	140-198	37.5	471
	1965	588	428-747	225	152-299	38.3	588
319	1962	940	-	481	330-632	51.2	755
	1963	706	508-904	372	267-478	52.7	736
	1964	474	408-541	254	223-285	53.5	504
	1965	745	566-924	448	364-531	60.1	765
320	1962	1207	-	1232	992-1472	102.1	1651
	1963	1640	1338-1941	1670	1494-1845	101.9	2217
	1964	1394	1280-1507	1416	1355-1478	101.6	1908
	1965	1160	936-1383	832	691-972	71.7	1537
361	1962	NOT CREATED UNTIL 1963					
	1963	92	21-164	70	36-101	76.1	101
	1964	85	57-113	50	36-64	59.5	101
	1965	69	15-124	20	0-44	29.1	69
Dist. 3	1962	25219	-	23790	22822-24758	94.3	33014
	1963	23562	22470-24654	23818	23080-24556	101.1	33969
	1964	20321	19910-20733	18973	18714-19233	93.4	28556
	1965	17322	16492-18152	13262	12712-13813	76.6	23019

* Ninety-five percent confidence limits.

As indicated in Table 2, all non-resident deer hunters accounted for 14% of the deer harvested from 1962 to 1965. In 1962, the last year $20 non-resident deer licenses were available for District Three, all non-residents harvested 12% of the deer. It is also interesting to note that "first deer" for both residents and $100 non-residents (Table 2) constitutes about 70% of their respective deer harvests.

The sex and species of the deer harvested for the years 1962-1965 is presented in Table 3. In spite of either sex seasons, antlered or male deer are harvested at the rate of about two for every female or antlerless deer.

TABLE 2. District Three Resident and Non-Resident Deer Harvest, 1962-1965.

Area	Year	*	Resident			Non-Resident			$20
		Harvest	1st Deer	2nd Deer	Total	1st Deer	2nd Deer	Total	N.R.
30	1962	1129	588	330	918	118	94	212	
	1963	1543	667	470	1138	207	199	405	
	1964	1501	669	436	1105	227	169	396	
	1965	638	348	174	521	58	59	117	
31	1962	1941	932	688	1620	212	110	321	
	1963	2071	1016	592	1608	290	174	463	
	1964	1694	811	403	1214	313	167	480	
	1965	1078	567	195	762	210	106	316	
32	1962	411	387	--	387	24	0	24	
	1963	258	121	46	167	66	25	91	
	1964	375	226	57	283	69	23	93	
	1965	221	154	9	163	58	0	58	
33	1962	4951	2438	1592	4029	556	353	909	13
	1963	5181	2655	1608	4262	546	372	919	
	1964	4014	1962	1109	3072	551	391	942	
	1965	2716	1471	613	2084	397	235	632	
34	1962	549	444	57	502	47	0	47	
	1963	288	273	15	288	0	0	0	
	1964	322	247	49	297	20	6	26	
	1965	185	174	--	174	12	-	12	
35	1962	302	272	14	287	16	0	16	
	1963	379	379	0	379	0	0	0	
	1964	273	246	11	257	13	3	16	
	1965	170	141	17	159	12	0	12	
36	1962	97	57	-	57	39	0	39	
	1963	1044	319	394	713	182	149	331	
	1964	487	154	138	291	119	77	196	
	1965	258	127	61	188	58	12	70	
37	1962	129	129	--	129	0	0	0	
	1963	91	91	0	91	0	0	0	
	1964	83	70	11	82	1	0	1	
	1965	38	29	9	38	0	0	0	
38	1962	695	444	172	617	39	39	78	
	1963	436	364	30	394	41	0	0	
	1964	495	415	34	449	35	10	46	
	1965	461	319	61	380	70	12	82	
39	1962	2304	1290	860	2151	47	24	71	83
	1963	1918	1168	667	1835	33	50	83	
	1964	1137	702	340	1042	51	43	94	
	1965	898	556	295	851	35	12	47	

TABLE 2 - CONTINUED.

		*	Resident			Non-Resident			$20
Area	Year	Harvest	1st Deer	2nd Deer	Total	1st Deer	2nd Deer	Total	N.R.
310	1962	280	172	14	186	86	8	94	
	1963	370	212	0	212	149	8	157	
	1964	135	70	10	80	43	13	56	
	1965	100	76	0	76	23	0	23	
311	1962	1401	860	387	1247	86	55	141	13
	1963	1083	865	61	925	149	8	157	
	1964	957	702	133	835	92	30	123	
	1965	824	491	169	660	105	59	164	
312	1962	4145	2352	1477	3828	94	63	157	160
	1963	3325	2078	1031	3110	116	99	215	
	1964	2427	1509	781	2289	79	58	137	
	1965	1884	1190	530	1720	93	71	164	
312.1	1962	AREA NOT CREATED UNTIL 1965.							
	1963								
	1964								
	1965	50	50	0	50	0	0	0	
313	1962	504	301	158	459	24	16	39	6
	1963	298	167	106	273	25	0	25	
	1964	322	173	98	270	28	23	52	
	1965	113	78	35	113	0	0	0	
314	1962	651	358	258	617	16	0	16	19
	1963	818	516	228	743	25	50	74	
	1964	856	490	268	758	58	41	99	
	1965	571	332	87	419	128	24	152	
315	1962	1051	617	373	989	8	16	24	38
	1963	1151	667	410	1077	25	50	74	
	1964	999	671	269	939	35	25	60	
	1965	900	514	304	818	47	35	82	
316	1962	66	14	14	29	31	0	31	6
	1963	54	46	0	46	8	0	8	
	1964	74	23	6	28	45	0	45	
	1965	17	17	0	17	0	0	0	
317	1962	1254	746	401	1147	31	31	63	45
	1963	1063	652	303	956	66	41	108	
	1964	931	548	310	858	47	26	73	
	1965	614	402	165	567	23	24	47	
318	1962	215	201	14	215	0	0	0	
	1963	335	303	15	319	17	0	17	
	1964	169	154	15	169	0	0	0	
	1965	225	213	0	213	12	0	12	

TABLE 2 - CONTINUED.

		*	Resident			Non-Resident			$20
Area	Year	Harvest	1st Deer	2nd Deer	Total	1st Deer	2nd Deer	Total	N.R.
319	1962	481	444	29	423	8	0	8	
	1963	372	364	0	364	8	0	8	
	1964	254	219	27	245	7	1	9	
	1965	448	389	35	424	12	12	23	
320	1962	1232	645	430	1075	102	55	157	
	1963	1670	1031	531	1562	50	58	108	
	1964	1416	835	446	1282	82	52	134	
	1965	832	513	178	691	93	47	140	
361	1962								
	1963	70	46	0	46	17	8	25	
	1964	50	29	2	30	17	3	20	
	1965	20	20	0	2	0	0	0	
D-3	1962	23790	13693	7270	20963	1582	862	2444	383
	1963	23818	14001	6507	20508	2019	1291	3121	
	1964	18973	10924	4953	15877	1935	1162	3096	
	1965	13262	8173	2937	11110	1447	706	2153	

* Point estimate.

TABLE 3. District Three Deer Harvest by Species and Sex.

		Sex			Species		
Area	Year	Antlered	Anterless	Unknown	Mule Deer	Whitetail	Unknown
30	1962	773	326	30	1013	37	80
	1963	848	672	23	1420	123	0
	1964	843	629	29	1404	51	47
	1965	390	249	0	580	29	29
31	1962	1192	742	8	1789	145	81
	1963	1283	750	39	1878	148	46
	1964	1022	645	27	1496	118	80
	1965	732	346	0	971	61	46
32	1962	282	129	0	317	65	29
	1963	157	92	8	203	40	15
	1964	254	116	5	332	30	14
	1965	116	105	0	191	30	0
33	1962	2864	1974	112	4426	250	274
	1963	3104	2000	77	4618	334	229
	1964	2425	1542	48	3657	217	140
	1965	1637	1036	43	2532	71	113
34	1962	267	282	0	484	51	14
	1963	197	76	15	273	0	15
	1964	211	108	4	276	40	6
	1965	152	33	0	135	30	20

TABLE 3 - CONTINUED.

		Sex			Species		
Area	Year	Antlered	Anterless	Unknown	Mule Deer	Whitetail	Unknown
35	1962	166	137	0	259	43	0
	1963	212	167	0	334	30	15
	1964	204	66	4	249	17	7
	1965	133	38	0	153	17	0
36	1962	60	37	0	97	0	0
	1963	632	404	8	1021	23	0
	1964	290	193	4	473	13	2
	1965	151	107	0	249	0	9
37	1962	100	29	0	115	14	0
	1963	61	15	15	91	0	0
	1964	64	19	0	66	15	2
	1965	17	20	0	38	0	0
38	1962	442	224	29	666	29	0
	1963	290	146	0	390	46	0
	1964	320	172	3	436	50	9
	1965	374	87	0	444	17	0
39	1962	1573	723	8	2204	57	43
	1963	1215	703	0	1819	8	91
	1964	707	419	11	1052	33	51
	1965	683	207	9	796	29	72
310	1962	170	111	0	266	14	0
	1963	221	134	15	314	40	15
	1964	67	64	4	112	13	10
	1965	66	33	0	88	0	12
311	1962	751	628	22	1213	123	65
	1963	674	370	39	983	54	46
	1964	581	369	7	853	64	40
	1965	475	349	0	708	61	55
312	1962	2732	1384	29	3851	135	158
	1963	2182	1113	30	2966	244	114
	1964	1479	930	17	2261	87	79
	1965	1246	638	0	1764	82	38
312.1	1962	AREA NOT CREATED UNTIL 1965					
	1963						
	1964						
	1965	50	0	0	50	0	0
313	1962	288	188	29	433	0	72
	1963	259	39	0	298	0	0
	1964	186	131	5	306	4	12
	1965	78	35	0	104	0	9

TABLE 3 - CONTINUED.

		Sex			Species		
Area	Year	Antlered	Anterless	Unknown	Mule Deer	Whitetail	Unknown
314	1962	516	135	0	580	29	43
	1963	535	268	15	702	39	77
	1964	555	298	3	803	39	15
	1965	364	207	0	503	46	22
315	1962	682	362	8	959	64	29
	1963	692	429	30	1022	54	76
	1964	710	280	9	943	28	28
	1965	682	210	9	865	26	9
316	1962	51	16	0	66	0	0
	1963	39	0	15	39	15	0
	1964	42	29	3	63	8	3
	1965	17	0	0	9	0	9
317	1962	826	428	0	1097	29	129
	1963	666	397	0	912	61	91
	1964	631	298	1	849	48	34
	1965	457	158	0	584	0	30
318	1962	172	43	0	186	14	14
	1963	259	76	0	290	30	15
	1964	110	57	2	160	8	2
	1965	159	58	9	208	9	9
319	1962	223	258	0	467	14	0
	1963	145	228	0	357	15	0
	1964	139	115	0	235	11	8
	1965	352	84	12	419	17	12
320	1962	782	426	24	1137	51	44
	1963	841	798	30	1495	106	69
	1964	870	530	16	1217	82	117
	1965	549	283	0	742	78	12
361	1962						
	1963	47	23	0	54	17	0
	1964	34	17	0	46	3	1
	1965	9	12	0	20	0	0
D-3	1962	14911	8581	297	21625	1164	1001
	1963	14558	8899	361	21478	1426	914
	1964	11743	7026	204	17288	978	707
	1965	8889	4293	81	12154	604	505

Checking stations were operated in Area 38 in connection with the elk season. Twenty-four deer were checked through the stations in 1964 and 1965 (Tables 4 and 5). There were five stations operated for 3 days in 1964 and 6 stations operated for two days in 1965. A checking station was operated south of Dillon for four days in 1965. Two hundred and fifty-five deer were checked (Table 6).

During the 1962 elk season, several checking stations were operated to check elk hunters from the Gravelly area. Deer were also checked at these stations although the primary species being checked was elk. The information collected at these stations appears in Tables 7 and 8.

TABLE 4. Checking Station Information Collected October 18, 19 and 20, 1964, Area 38.

	Successful			Unsuccessful
Checking Station	No. Hunters	Deer	Elk	Hunters
Johnny Gulch	12	3	10	116
Prickly Pear	11	1	10	154
Winston	9	5	5	80
Indian Creek	28	9	20	303
Radersburg	20	6	15	128
Total	80	24	60	781

TABLE 5. Checking Station Information Collected October 24 and 25, 1965, Area 38.

	Successful			Unsuccessful
Checking Station	No. Hunters	Deer	Elk	Hunters
Johnny Gulch	12	5	7	122
Jefferson City	7	1	6	107
Winston	14	4	10	170
Indian Creek	17	10	8	197
Radersburg	4	4	0	103
Dry Creek		0	0	10
Total	54	24	31	709

TABLE 6. Deer Harvest Information Collected at a Hunter Checking Station south of Dillon, October 24, 25, 30 and 31, 1965.

		Harvest *					
		Adults				Fawns:	Fawns:
Area	Date	M	F	Fawns	Total	Females	Adults
30	11/24-25/65	13	12	12			
	11/30-31/65	12	23	4	76	46:100	27:100
31	11/24-25/65	6	5	5			
	11/30-31/65	11	15	2	44	35:100	19:100
33	11/24-25/65	23	23	10			
	11/30-31/65	23	32	24	135	62:100	34:100
Totals		88	110	57	255	52:100	29:100

*Hunter success approximately 33%.

TABLE 7. Deer Harvest Information, Area 33, 1962. 1/

	Checking Stations									
	Ruby		Ennis 2/		West Fork		Blacktail		Total	
Date	No. of Hunters	No. of Deer	No. of Hunters	No. of Deer	No. of Hunters	No. of Deer	No. of Hunters	No. of Deer	No. of Hunters	No. of Deer
Oct.										
21	601	172	189	31	155	11	193	33	1138	247
22	400	58	128	28	196	4	132	44	866	134
23	565	36	189	7	260	2	166	20	1180	63
24	54 3/	22			164	18 4/			218	42
25					71				71	
Total		288		66		35		97	3573	486

1/ See elk surveys completion report W-73-R-8-9-10.

2/ Two stations combined.

3/ Deer harvest data combined for October 24 and 25 and operated one-half day.

4/ Deer harvest data combined for October 24 and 25.

TABLE 8. Sex and Age of Deer checked by Ruby Checking Station, October 21-23, 1962.

Age (years)	Sex (Number)			
	Male	Female	Total	Percent
7 ½ +	7	7	14	8
2 ½ - 7 ½	31	22	53	31
1 ½	52	14	66	39
½	20	16	36	22
Total	110	59	169	

Population

Table 9 is a summary of deer herd composition from January, 1959 through April, 1966.

Some incidental observations should also be noted. In Area 30, 172 deer were observed while "reading" browse transects in the Chute Canyon-Deer Canyon Creek area in mid-April, 1964. In Area 33, 415 deer were seen incidental to an antelope survey in February, 1966. In early March, 1964, 146 deer were observed during a moose-elk survey in Area 33 near Clark Canyon Reservoir and in Area 319 on January 27, 1964, 379 deer were seen incidental to an aerial elk survey.

TABLE 9. District Three Deer Herd Composition from Aerial Surveys, 1959-1966.

Area	Date	Location	F	M	Fawns	Uncl. Adults	Total	Fawns: 100 Does	Fawns: 100 Adults
30	Winter	Big Sheep Cr.			139	239	378	--	58
	1962-63	Little Sheep Cr.			169	279	448	91 1/	61
	4/2/63	Deer Canyon Cr.			37	70	107		53
		Total			345	588	933		59
	2/11/64	Little Sheep Cr.	57	11	58		126	102	85

TABLE 9 - CONTINUED.

Area	Date	Location	F	M	Fawns	Uncl. Adults	Total	Fawns: 100 Does	Fawns: 100 Adults
30	12/21/65	Muddy Cr.	13	2	3		18	23	20
	1/31/66	Med. Lodge Cr.	3	1	5	9	18		38
	3/29/66	Med. Lodge Cr.			8	14	22		57
	1/19/66	Little Sheep Cr.	18	3	9		30	50	43
	3/9/66	Little Sheep Cr.	11		24	29	64		60
		Total	45	6	49	52	152		48
31	Winter 1962-63	Scudder Creek			91	186	277		49
	2/20/64	Birch Cr.	22	6	19	6	53		56
	2/25/64	Birch Cr.	35		30	19	84		55
		Total	57	6	49	25	137		56
	1/28/66	Birch Cr.		2	3	4	9		50
	3/11/66	Birch Cr.		2	6	10	18		50
	3/11/66	Bannack			7	13	20		53
	3/17/66	Scudder Cr.		1	6	12	19		46
		Total		5	22	39	66		50
33	3/25/60	Wall Cr. Flats	63		19	32	114		20
	Winter 1962-63		6	13	68	174	261		35
	3/18/64	Lima Reservoir			40	40			100
36	3/8/60	Jack Cr.	163	2	41	78	284		32
	3/9/60	Jack Cr.	58		17	4	79	29	27
	3/9/60	Bear Cr.	35		21	184	240		10
		Total	256	2	79	266	603		15
	Winter 1962-63		89	13	27		129	30	27
38	12/30/59	Limestone Hills	1		1		2	100	100
	12/31/59		27	6	7		40	26	21
	1/5/60		71	2	32		105	45	44
	2/11/60		61	6	22		89	36	33
	2/11/60		56	11	11	8	86	20	15
	3/2/60		48	1	22		71	46	46
	3/2/60		19		6		25	30	30
		Total	283	26	101	8	418		32
39	2/10/60	Deep-Duck Cr.	13		5		18	38	38
	2/9/60		45	1	18		64	40	39
	2/9/60		1		1		2	100	100
	3/1/60		57		19		76	33	33
		Total	116	1	43		160	37	37
	Winter 1962-63				41	89	130		46

TABLE 9 - CONTINUED.

Area	Date	Location	F	M	Fawns	Uncl. Adults	Total	Fawns: 100 Does	Fawns: 100 Adults
311	1/12/60	Gallatin Canyon	23	3	7		33	30	27
	2/23/60		7	2	4		13	57	44
	1/22/60		13	6	8		27	61	42
	3/15/60		20		7		27	35	35
		Total	63	11	26		100	41	35
312	1/4/60	Near Bozeman	6		3		9	50	50
	12/22/59	W. Side Bridgers	4	2	4		10	100	67
	12/23/59	Armstrong's 16-Mile	3		4		7	133	133
	2/4/60		8	3	3		14	38	27
	2/8/60		47		27		74	57	57
	2/9/60		27	2	8	2	39	30	26
	2/26/60		22	5	14		41	64	52
	2/29/60		43		14	2	59	32	31
	12/28/59	Horseshoe Hills	8	1	1		10	13	11
	2/23/60		7	2	4		13	57	44
	3/1/60		20	1	12		33	60	57
		Total	195	16	94	4	309	47	45
313	3/3/60	Gardiner-Jardine	137	10	38	1	186	28	26
314	1/4/60	Big Creek	17	7	5		29	29	20
	1/28/60		11	2	1	6	20	9	5
	2/19/60	Strickland Cr.	132	5	61		198	46	45
	3/3/60		52	1	16		69	31	31
	1/7/60	Trail Creek	23	4	18		45	78	67
	2/17/60		6		2		8	33	33
	3/3/60		51		17		68	33	33
	1/27/60	8-Mile Creek	2	7			9	0	0
	2/19/60		5		1		6	20	20
	3/3/60		4		4		8	100	100
		Total	303	26	125	6	460		
315	2/18/60	Horse Creek	34	1	17	1	53	50	48
	3/2/60		38		12		60	32	32
		Total	72	1	29	1	113	40	40
317	1/27/60					30			
	1/28/60		12	9	7		28	58	33
	3/3/60		29		9		38	31	31
		Total	41	9	16	30	66	40	32
319	1962-63		1	1	30	63	95		46
	3/30/64				44	96	140		46
320	1962-63				22	64	86		34

1/ 157 deer observed and classified January 19, 1963.

Range

There are 133 browse transects on deer winter ranges in District Three. Of the 10 key browse species recorded, mountain mahogany, bitterbrush and big sagebrush are the most important. There are also 6 exclosures in the District (Table 10). All browse information recorded in District Three are included in this report and cover the period 1957-1966. Cole's method of recording condition and utilization was followed. However, on a few transects a 2x5 dm plot frame was used to estimate canopy-coverage. A study of the mountain mahogany range in Scudder Creek, Area 31, is covered in a separate segment. Special studies at exclosure sites are shown and some information is given for progressive use of mahogany ranges by deer in the winter. Observations of deer relationships to sagebrush are recorded for a few sites.

In Areas 30, 31, 32, 321, 33, 318 and 319 the transect data, observations and more detailed studies have been evaluated, as well as reported. For Areas 34, 35, 36, 37, 38, 39, 311, 312, 312.1, 313, 314, 315, 317, 320 and 361, the complete summarized data are presented but no evaluation is made at this time.

Deer range information for each deer hunting area appears in chronological order starting with Area 30. The browse transect tables are presented in this order. At the conclusion of this section suggestions for analyzing District Three deer winter ranges is presented.

TABLE 10. Deer Winter Range Browse Transects, District Three.

Deer Hunting Area	Deer Bag Limits 1966	Deer Browse Transects	Number of Exclosures and Species	Key Species and Number of Transects 1/
30	2	9	3 - Cele	Cele (9)
31	2	18		Cele (18)
32 Big Hole	1	None		--
33	2	16		Cele (10), Artr (4), Arca (1), Chna (2)
34	1	9		Cele (9)
35	1	4		Cele (3), Putr (1)
36	2	12		Amal (5), Artr (6), Prvi (1), Chna (1)
37	1	1		Cele (1)
38	2	5	1-Cele	Cele (5)
39	1	8		Cele (1), Putr (3), Chna (1), Rhtr (2), Artr (1)
310 Upper Gallatin	1	None		--
311	1	3		Salix (1), Artr (2)
312	2	6	2 - Putr	Cele (1), Amal (1), Putr (3), Artr (1)
312.1	1	2		Putr (2)
313	1	2		Artr (2)
314	2	2		Artr (1), Rhtr (1)
315	2	2		Prvi (1), Amal (1)
316 Absaroka	1	None		--
317	2	1		Rhtr (1), Priv (1)
318	1	9		Cele (2), Putr (7)
319	1	13		Cele (2), Putr (5), Artr (3), Arar & Artr (3)
320	1	10		Cele (9), Putr (1)

TABLE 10 - CONTINUED.

Deer Hunting Area	Deer Bag Limits 1966	Deer Browse Transects	Number of Exclosures and Species	Key Species and Number of Transects 1/
321 Big Hole	1	None		--
361	1	1		Amal (1)
Totals		133	4 Exclosures (cele) 2 Exclosures (putr)	Cele (70), Putr (22), Artr (20), Arar & Artr (3), Arca (1), Amal (8), Rhtr (4), Chna (4), Prvi (3), Salix (1), 10 Species - Total 136

1/ At three transects, an additional species was recorded.

Area 30

The key browse is mountain mahogany and all transects are on this species. Most of the deer winter range in Area 30 is located on National Forest and BLM lands. During "open" winters deer are able to scatter widely over much of Area 30. Normally, deer use southern exposures adjacent to ridge tops rather than bottom lands. Numerous observations have been made of deer herds on the sagebrush-grassland range type. In the Muddy Creek drainage this type is the most important component of the deer winter range. It is also important in other areas of District 30.

Table 11 clearly indicates the key species, mountain mahogany, cannot in its present deteriorated condition support the existing deer population. If it could, the condition and utilization would not be what it is. It is very likely that present numbers of deer are dependent on less desirable browse species for winter forage. Even in mild and open winters the mahogany cannot now support the deer herd without further plant deterioration. Good leader growth, the result of favorable growing conditions, has also been nullified by excessive deer browsing. In the north portion of the Tendoy Mountains usage on leaders out of the reach of deer, was noted by elk. Domestic sheep usage on mahogany was noted in the northeast part of the Tendoy Mountains, however, this use is inconsequential when compared to that by deer in Area 30.

An indication of the condition of the deer winter range in area 30 can be gained by carefully examining Table 11. Although there are variations between certain years on some transect readings, the trend is evident. Transect No. 232 shows a downward trend in condition correlated with increasing utilization over a number of years. It was mentioned that deer were observed using higher elevations on the southern exposures. Transect No. 231 is located near the base of a slope, No. 230 about half way up the exposure and the other "reading" just below the ridge top in the Middle Fork of the Little Sheep. These transects are all at about the same location but at different elevations on the slope. A more deteriorated condition with heavier utilization was recorded near the top. Transect No. 229 with most plants in form class 6, indicates a trend towards increasing unavailability. The canopy out of deer reach is assuming a healthy condition. This is shown in transect No. 233. Under seven continous years of severe utilization, transect No. 234 shows an increase of form class 6's, a decrease in class 3's and a large number of dead and decadent plants. One hundred mahogany plants were examined in Muddy Creek in 1963 and all were found to be decadent. Transect No. 236 indicates disappearance of available plants. While class 3's were reduced, 6's increased. An exceedingly large number of dead plants were recorded. Those plants in class 6 are being pruned of all available leader growth. Elk use was recorded on certain plants along transect No. 236. Form class 6's appear to develop a healthy less decadent canopy as they grow out of deer reach. At transect No. 235 most plants are decadent (Avg. 84%). On this site the amount of dead crown averages 46%. Table 11 indicates mahogany in the West Fork of Little Sheep Creek was probably in relatively fair condition when the transect was first installed. Table 11 also shows the relatively better condition of mountain mahogany in the Little Sheep drainage than elsewhere in Area 30. Form class 6's are less numerous than elsewhere. However, in recent years there has been an increase of this form class with range abuse. The total average leader use in the Little Sheep drainage was 58 percent with average dead crown 33 percent. For the rest of Area 30 the total average leader use was 77 percent with average dead crown 40 percent. Mountain mahogany deterioration has been rapid under increasing utilization even with the compensating factors of mild winters and some good leader growth. Poor leader growth for a few years coupled with a long severe winter could take a heavy toll on a large deer population. Presently there is not enough mahogany to support the existing deer population during a mild winter following a season of good leader growth. During winter deer are often observed on the sagebrush-grassland type. In Chute Canyon at transect No. 233, black sagebrush (Artemisia hova) was abundant.

Deer herd composition counts in Area 30 indicate 90 t0 100 fawns per 100 females or about 60 fawns per 100 adults. The most important deer wintering areas in hunting district 30 are the Little Sheep and Big Sheep drainages and the Tendoy Mountains. On January 19, 1963 along 12 miles of observational route in Little Sheep Creek an average of about 14 deer per mile were observed. On March 6, 1965 between 6:30 and 9:30 A.M., 306 deer were classified in Little Sheep Creek. There was not much snow on the winter range and about one-half the deer were observed in the mountain mahogany type and the other half on the sagebrush-grassland type.

In late September 1963, a field survey of mountain mahogany deer ranges in southwestern Montana was made by USFS and Fish and Game Department personnel. The following comments concern Area 30:

Little Sheep Creek

Middle Fork: We examined a mahogany stand on a southwestern exposure with a shallow soil developed from sandstone. The idea was expressed that mahogany is definately associated with soil - in deeper soils there is too much competition from other species. Probably mountain mahogany should be considered a climax type. Plants frequently associated with mahogany include: limber pine (Pinus flexilis), Rocky Mountain Juniper (Juniperus scopulorum), rabbitbrush (Chrysothamnus spp.), fringed sagewort (Artemisia frigida), cactus (Opuntia spp.), Indian ricegrass (Oryzopsis hymenoides), bluebunch wheatgrass (Agropyron spicatum). A good age class distribution of mahogany was observed from young plants, that apparently developed from seed, to old mature plants that succumbed. Death may have been due to old age and/or competition. (This in no way implies that death is not due to severe hedging.) Numerous dead plants were present. A plentiful supply of awns and seeds were found under the mahogany plants. First year seedlings and other young seedlings were plentiful. There may be some resprouting from old dead plants. The mahogany assumes a low shrub form in this area. This results in more available feed than in the tree form.

East Fork: We observed mountain mahogany growing on a steep southeastern exposure with an understory of vigorous bluebunch wheatgrass.

West Fork: Associated with mahogany on this area were: rabbitbrush, big sagebrush (*Artemisia tridentata*) and Indian ricegrass. This was a southern exposure with a soil developed from sandstone. The mahogany is of the low shrubby form. Young seedlings were observed. Although there has been heavy use on mountain mahogany, it could recover if the usage is reduced.

Big Sheep Creek

We looked at the mahogany in the vicinity of the Fish and Game Department transect. Plants associated with mahogany include cactus, big sagebrush and needle-and-thread, (*Stipa comata*). Where environmental conditions are severe, mountain mahogany is found. There was plenty of young reproduction here. If usage could be reduced, perhaps by half, there might be good recovery. Klemmedson and Ferguson expressed the belief that management is the answer here, not the manipulation of vegetation. The potential of this mountain mahogany range is evident when the number of young plants present is considered. The opinion was expressed that 40 percent current leader use over an extended period may result in an improvement of range conditions.

It is apparent that mountain mahogany can perpetuate itself on a favorable site over a long period of time. It may therefore, be considered a climax species on the sites examined. How long mahogany will remain on these sites with continual over-browsing is another question. The point has been reached on certain mahogany deer winter ranges where the browse production over extensive areas is negligible and is only a minute fraction of its potential. The most deteriorated ranges can be brought back into full production, but not under the present utilization.

A drastic reduction in the amount of existing deer use is necessary for any recovery at all.

TABLE 11. Mountain Mahogany Deer Winter Range Condition, Utilization and Trend. 1958 to 1966. Area 30.

		Form Classes Percentages						Age Classes Percentages						
Location	Year	1	2	3	4	5	6	Y+	M+	D+	Avg. % Dead Crown	Av. % Current Leader Use	No. Dead Plants	No. Unavailable Plants
Little Sheep														
Creek	1958	8	80	12					64	36		25	2	
West Fork	1959	8	52	40						100		19		
Trans. #232	1960	6	66	26		2			40	60	33	18	5	
(Formerly #293)	1961		60	40					2	98	55	28	2	
	1962		8	92						100	55	78	1	
	1963	16	80	2		2			6	94		58		
	1964		8	64		8	20		26	74	46	80	13	2
	1965		34	54		4	8		78	22	19	87		
	1966		10	86		2	2		58	42	24	39	3	
Little Sheep														
Creek	1961		12	88					64	36	18	50	3	
Middle Fork	1962		8	88			4		32	68	37	56		
Trans. #231	1963	8	68	16	4	4		12	48	40		43	2	
(Formerly L.5-3														
A-3)	1964		56	24		16	4		76	24	16	52		
	1965		52	28	4	8	8		80	20	15	83		
	1966	8	24	64		4			64	36	21	46	3	

TABLE 11 - CONTINUED.

Location	Year	Form Classes Percentages 1	2	3	4	5	6	Age Classes Percentages Y+	M+	D+	Avg. %. Dead Crown	Avg. % Current Leader Use	No. Dead Plants	No. Unavail-ble Plants
Little Sheep Cr., Middle Fork Transect #230	1964		18	50	2	16	14		12	88	40	45	14	
	1965		28	60		4	8		72	28	17	84		
	1966		4	72		4	20		36	64	32	74		
Little Sheep Cr., Middle Fork-No Transect Established	1964			68			32		24	76	36	84	1	
Little Sheep Creek E. Fork Transect #229 (Formerly L.S.-2 A-2)	1961			24			76		28	72	36	59		
	1963	2		24		2	72		32	68		87	10	7
	1964			16			84		52	48		65	6	5
	1966			20		16	64		8	92	61	71	1	5
Chute Canyon Trans. #233 (Formerly S.C.-1)	1961			84			16		20	80	38	76	4	
	1963		4	68			28		34	66		90		
	1964			58			42		38	62	35	90	29	
	1965			74			26		62	38	27	90		
	1966			88			12		54	46	31	59	11	
Big Sheep Cr. Trans. #234 (Formerly #345)	1960		4	88			8	2	40	58	32	81	12	
	1961			94			6		38	62	34	87		
	1962		6	84			10		14	86	44	89	8	
	1963			80			20		30	70		88	6	
	1964			68			32		16	84	43	90	14	
	1965			80			20		48	52	28	90		
	1966			74			26		26	74	35	79	6	
Muddy Cr. Trans. #255 (Formerly M-1)	1961			98			2		2	98	49	88		
	1963			98			2			100		90		
	1966			96			4		12	88	36	88		
Deer Canyon Cr. Trans. #236	1963			54			46	4	20	76		77	31	1
	1964			26			74		36	64	37	90	43	5
	1965			64			36		36	64	36	90		
	1966			26			74		10	90	60	90	19	
Kate Cr., Trans. #235 (Formerly 192 (KC-1))	1958*	16	4	80				24	64			52		
	1959			82		4	14		6	94		30	2	
	1960			82			18		28	72	41	77	3	
	1961			96			4		4	96	52	58	4	
	1962			78			22		12	88	49	90		
	1963			82			18		22	78		55	3	
	1964			68			32		8	92	49	78	8	
	1965		2	72			26		18	82	42	87		
	1966			74			26		32	68	41	18	13	

+Y=Young, M=Mature, D=Decadent. * 12% assigned to "seedling" age class.

Area 31.

The key browse species on deer winter ranges in Area 31 is mountain mahogany. There are 18 transects on this species plus two exclosure study sites at Lost and Scudder Creeks. The detailed Scudder Creek study report is covered as a separate section. Browse information from 1958 to 1966 appears in Table 12. Table 13 is a complete summary of condition and utilization of mountain mahogany, both outside (Transect #213) and inside the Lost Creek exclosure. Apparently this exclosure was built at the same time as the Scudder Creek exclosure (1953) by Phil South. This exclosure was repaired August 19, 1963. Plants both inside and outside along the transects were tagged on August 11, 1964. The condition of the mahogany plants inside the Scudder and Lost Creeks exclosures are similar and have apparently reached a static condition, but not necessarily maximum production of browse.

Deer winter ranges in Area 31 are severely abused except for the northeast portion of Area 31 (Table 12). Twenty-seven browse "readings" were averaged on four transects, in Trapper Creek, Cattle Gulch, Lower Canyon Creek and Upper Canyon Creek and cover the period 1958 to 1966. A summary follows:

Form Class 3 & 6	Age Class Decadent	Dead Crown Average	Average Leader Use
59%	30%	19%	50%

Table 12 shows no apparent improvement in condition of mahogany under an average leader use of 50 percent. (50 percent use on plants in good condition is less detrimental than 50 percent use on plants in poor condition.)

Plants along the transect in Cattle Gulch (#215) are in better condition than those along any other transect in Area 31. A summary of "readings" covering the period 1958 to 1966 is as follows:

Form Class (%)			Age Class (%)				% D. C.	Average Leader Use
1 & 4	2 & 5	3 & 6	S	Y	M	D	(3-Year Avg.)	%
24	48	28	9	Tr.	64	27	20	14

The leader use in any one year never exceeded 25 percent, yet on range in "good" condition there is apparently no improvement shown in condition from 1958 to 1966.

The present method of measuring browse works well on our severely abused deer winter ranges. But no one should need a method with the present condition of deer winter range in Area 31 to know there are too many deer on most of these ranges. Modification of present or development of new methods will be necessary to evaluate use by maximum deer populations on ranges in excellent condition. The following summary of information from inside the Lost Creek exclosure can be compared with that from Cattle Gulch.

Form Class %		Age Class %				% D. C.	Leader
1	2	S	Y	M	D	Average	Use
93	7	37	30	28	5	4	0

Table 14 shows progression of leader use by deer and/or sheep for the transects at Red Butte and Dyce Creek.

Sagebrush may be important as a winter browse on deer ranges in Area 31. On transect #204, north of Bannack, heavy use was noted on sagebrush on May 5, 1964. Use of sagebrush by deer was also observed in the Pioneer Mountains. At transect #201, Stapleton Gulch, adjacent to the mountain mahogany, which is over-browsed and in poor condition, is a stand of Artemisia arbuscula (low sagebrush).

TABLE 12. Browse Information from Deer Winter Ranges, 1958 - 1966, Area 31.

Transect			Key	No. of	Form Class	%		Age Class %			%	%
Number	Year	Location	Species	Plants	1&4	2&5	3&6	Y	M	D	Use	D.C.
201	1962	Stapleton	Cele			52	48		16	84	87	40
(Was	1963	Gulch	"			2	98		16	84	89	
34)	1964	"	"				100		48	52	90	
	1965	"	"				100		12	88	89	
	1966	"	"			20	80		46	54	13	34
202	1962	Good Friday	Cele			70	30		24	76	79	37
(Was	1963	Gulch	"				100		46	54	89	
33)	1964	"	"				100		46	54	90	
	1966	"	"			34	66		54	46	43	33
203	1963	Good Friday	Cele				100		14	86	90	
(Was	1964	Gulch	"				100		78	22	90	
32)	1966	"	"			14	86		48	52	59	30
204	1961	Bannack	Cele			14	86		34	66	25	37
(Was	1962	Cemetery	"		2	48	50		32	68	66	40
37)	1963	"	"				100		40	60	66	
	1964	"	"			18	82		48	52	90	32
	1966	"	"			12	88	32	35	33	33	26
205	1960	East of	Cele				100		90	10	70	
(Was	1961	Bannack	"			10	90		60	40	44	22
38)	1962	"	"		2	42	56		56	44	73	22
	1963	"	"		2	2	96		64	36	81	
	1964	"	"			2	98		48	52	90	23
	1966	"	"				100	4	36	60	31	31
209	1958	Birch Creek	Cele		20	64	16	18*	22	50	11	
(Was	1959	"	"			18	82		20	80	58	
48)	1960	"	"		2	18	80	4	34	62	51	34
	1961	"	"			2	98		18	82	53	43
	1962	"	"		2	56	42		2	98	70	50
	1963	"	"				100	2	6	92	89	
	1964	"	"	50			100			100	90	
	1965	"	"	Tagged			100			100	90	
	1966	"	"				100		18	82	61	34
210	1961	Willow Creek	Cele			16	84		16	84	84	46
	1962	"	"			20	80		76	24	88	13
	1966	"	"			14	86		62	38	70	28
211	1964	Rock Creek	Cele				100		44	56	89	28
	1965	"	"				100		60	40	90	20
	1966	"	"		2	4	94	2	46	52	62	30
214	1959	Trapper Creek	Cele		4	28	68		36	64	63	
(Was	1960	"	"			20	80		84	16	69	11
354)	1961	"	"			20	80		64	36	45	23
	1962	"	"			36	64		76	24	88	16
	1963	"	"			2	98		42	58	81	
	1964	"	"			4	96		70	30	89	23
	1965	"	"				100		34	66	90	31
	1966	"	"			8	92		76	24	59	19

TABLE 12 - CONTINUED.

Transect			Key	No. of	Form Class		%	Age Class %			%	%
Number	Year	Location	Species	Plants	1&4	2&5	3&6	Y	M	D	Use	D.C.
215	1958	Cattle Gulch	Cele		60	24	16	2**	28	14	6	
(Was	1959	"	"		6	54	40		70	30	25	
173)	1960	"	"		16	68	16		92	8	23	
	1964	"	"	50	12	58	30		88	12	7	11
	1965	"	"	Tagged	22	44	34		46	54	17	21
	1966	"	"		30	36	34		58	42	4	28
216	1960	Lower Canyon	Cele			4	96		88	12	66	11
(Was	1961	Creek	"				100		68	32	41	24
353)	1962	"	"			14	86		60	38	82	23
	1963	"	"		2	37	61		78	22	71	
	1964	"	"			12	88		80	20	74	18
	1966	"	"		12	40	48		72	28	38	19
217	1959	Upper Canyon	Cele		16	56	28	4	64	32	42	
	1961	Creek	"		8	48	44		64	36	51	20
	1962	"	"		4	62	34		86	14	76	9
	1963	"	"		18	48	34	2	80	18	30	
	1964	"	"	50	2	48	50		78	22	44	17
	1965	"	"	Tagged	30	34	36		78	22	37	13
	1966	"	"		22	32	46		64	36	35	23
219	1961	Red Butte	Cele				100		2	98	76	49
(Was	1962	"	"			28	72		18	82	90	36
36)	1963	"	"				100			100	90	
	1964	"	"				100		4	96	90	46
	1965	"	"				100		48	52	90	33
	1966	"	"				100		42	58	63	31
220	1961	Dyce Creek	Cele				100		8	92	72	49
(Was	1962	"	"			36	64		12	88	90	53
35)	1963	"	"				100			100	90	
	1964	"	"				100		10	90	90	52
	1966	"	"			2	98		38	62	64	37
24	1961	New Depart. Mine	Cele				100	4	6	90	41	42
256	1961	New Depart.	Cele			10	90	6	32	62	21	32
(Was 25)	1966	Mine	"		12	56	32	4	58	38	17	21

* Also 10 percent seedlings. ** Seedlings = 56 percent.

TABLE 13. Condition and Utilization of Mountain Mahogany outside and inside the Exclosure on Lost Creek - Area 31.

Trans. #213 (formerly #50) Outside Date	Form Class % 1	2	3	6	Age Class % S	Y	M	D	Avg. % Dead Crown	Percent Leader Use	Union*	No. Tagged Plants
4/27/61		28	64	8			64	36	22	80		
4/4/63			72	28		2	70	28		64		
5/11/64		12	68	20			60	40	25	89		
9/14/64	28	34	30	8	4	20	64	12	11		T	50
9/14/64	4	44	37	15			78	22	17		O	27
9/14/64	57	22	22		9	43	48	0	3		U	23
6/3/65	4	26	62	8		18	62	20	19	69	T	50
6/3/65		11	74	15			70	30	26	90	O	27
6/3/65	9	43	48			39	52	9	12	45	U	23
5/13/66		8	84	8		20	60	20	18	70	T	47 (3 dead)
5/13/66		3	82	15			67	33	27	77	O	27
5/13/66		20	80			50	45	5	7	60	U	20

Lost Creek Exclosure 1/ (Adjacent to #213)

Inside	Form Class % 1	2	3	6	Age Class % S	Y	M	D	Avg. % Dead Crown	Percent Leader Use	Union*	No. Tagged Plants
9/14/64	86	14			38	24	28	10	5	0	T	21 2/
9/14/64	75	25					100		0	0	O	4
9/14/64	88	12			47	29	12	12	7	0	U	17
6/3/65	100				36	36	28		2	0	T	20 (1 dead)
6/3/65	100						100		6	0	O	4
6/3/65	100				44	44	12		1	0	U	16

*T= Total plant readings; O=overstory plant readings; U=understory plant readings.

1/ Exclosure repaired 8-19-63. Apparently built in 1953 by Phil South. (5 mi. N.W. of Glen at For. Bound. See location folder on file, Dillon)

2/ All observed mountain mahogany plants tagged inside exclosure 8-11-64, on 6-3-65 one plant dead inside exclosure but additional untagged seedlings and young plants observed.

TABLE 14. Progression of leader use on Mountain Mahogany by Deer and/or Sheep, Area 31.

Transect Number	Date	Location	No. Of Plants	Form Class 3 Percent	Age Class D Percent	Snow Depth (in.)	Leader Use Percent	Remarks
219 1/	12-3-65	Red Butte	25	100	44	1-2	1	
	12-17-65	Red Butte	25	100	44	1-2	58	Sheep use.
	12-31-65	Red Butte	25	100	44	2-4	66	Sheep off Range.
	1-17-66	Red Butte	25	100	44	6-8	66	Lt. Deer use.
220 2/	12-14-64	Dyce Creek	50		90	10	89	Hvy Deer use.
	12-3-65	Dyce Creek	25	100	96	0	62	Sheep use.
	12-17-65	Dyce Creek	25	100	96	1-2	70	(no indication
	12-31-65	Dyce Creek	25	100	96	2-3	66	of deer in area)
	1-17-66	Dyce Creek	25	100	96	4-6	66	

1/ Marginal deer winter range. Mahogany often snow covered.

2/ Heavier deer use on mahogany during winters of deeper snows.

Area 32 and 321.

There is no important deer wintering areas in 32 or 321. However, there is important spring, summer and fall deer range in these areas. In years of light snow cover deer are numerous in the fall along the Divide on the west side of Area 321. Apparently these deer winter in Idaho. The following observation was made in the East Big Hole (between Sawlog and Toomey Creeks) on June 11, 1965 and indicates a relationship of deer use of sagebrush. A deer fawn was under a big sagebrush (Artemisia tridentata) plant, 3 feet tall with a crown diameter of 4½ feet. The crown was 10 percent dead. Sagebrush canopy coverage was estimated at 30 percent. The maximum sagebrush height was 4 feet, but averaged 2½ feet tall. The fawn was about 50 yards from timber cover.

Area 33.

Sixteen browse transects are located on deer winter range in Area 33. The "key" species are, mountain mahogany, big sagebrush, silver sagebrush, and rubber rabbitbrush. The first browse reading recorded in Area 33 was in Axes Canyon in 1957. With few exceptions, browse transects in Area 33 show plants greatly deteriorated (Table 15). Deer are numerous. During an aerial antelope survey in late January of 1964, 255 deer were observed incidental to the survey between Armstead-Lima and the Lima Reservoir. These deer were using the sagebrush-grassland type. A few observations have been made of the relationship of mule deer to sagebrush in Area 33.

		Deer			Nearest	Line Intercept/ 100' Crown (Artr)			Height	
Date	Location	Sex	Age	Activity	Timber	Live	Dead	Total	Avg.	Max.
10-6-65	Metzel Cr.	5M	Adults	Resting	500 Yd	44'	15'6"	59'6"	3'0"	4'0"
10-13-65	S. Fork Warm Springs Creek	4F 4	Adults Fawns	Feeding	200 Yd	54'6"	3'0"	57'6"	3'0"	4'0"

Another observation concerned a fawn under a big sagebrush plant that was 22 inches tall on June 9, 1965 on the East Fork of the Blacktail Creek. This sagebrush plant had an average crown diameter of 30 inches (it was not decadent). Sagebrush on this northwest exposure, averaged 24 inches tall, had a maximum height of 36 inches, and an estimated 4000 plants per acre by the point quarter method. The nearest timber, from the fawn, was about one-quarter mile away. The elevation was between 6 and 7 thousand feet. Several other deer were observed in the area.

The browse transect in Axes Canyon is unique for District Three deer winter ranges. The condition of the mahogany is good over an extensive area. Leader use since 1957 has averaged only 15 percent on this transect. There is an abundance of mahogany of all age classes available to deer. However, deer selected leader growth from the younger mature plants more readily than from old mature plants. (This observation is verified in the Scudder Creek report. During the winter of 1965-66, four "readings" were made on leader use. On each occasion leader use was higher for understory plants growing in the open than on overstory plants. There may be a difference in nutritional value between the two unions.)

TABLE 15. Browse Transect Information from Deer Winter Ranges, Area 33. 1957-1966.

Trans.			Key	No. of	Form Class %			Age Class %			%	%
No.	Year	Location	Spp.	Plants	1&4	2&5	3&6	Y	M	D	Use	D.C.
33.1	1959	Stone Cr.	Cele	50		34	66		28	72	35	
	1960			25		16	84		32	68	69	
	1961			25		8	92		20	80	51	45
	1962			50		16	84		18	82	87	49
	1965			25			100		40	60	89	26
33.2	1965	Willow Spring Cr.	Cele	25			100		56	44	84	15
33.3 (Was 381)	1961	McHessor Cr.	Cele				100		24	76	66	46
	1963					96	4		56	44	71	17
	1965					80	20		20	80	87	38
33.4 (Was 348)	1959	Garden Cr.	Cele	25		8	92		44	56	59	
	1960			25	8	8	84		44	56	56	24
	1961			25	4	16	80		48	52	66	31
	1962			25	4	8	88		56	44	61	
	1963			25		4	96		56	44	37	20
	1965			25			100		44	56	54	38
	1966				4	20	76	12	44	44	71	37
33.5 (Was 226)	1958	Barton Gulch	Cele			4	96		76	24	62	
	1959			25	4	2	94		68	32	39	
	1960			25	8	8	84		76	24	53	12
	1961			25		12	88		60	40	72	
	1962					32	68		68	32	63	
	1963					8	92		36	64	65	30
	1965					32	68		42	58	84	21
	1966				16	20	64	12	44	44	84	29
33.6 (Was 55)	1960	Timber Cr.	Artr	25	20	68	12		100		40	
	1961			25	40	48	12		84	16	35	13
	1962			25					100		70	
	1965			50		42	58		28	72	91	
	1966				16	40	44	8	48	44	39	24
33.7 (Was 5 & 5M)	1959	Timber Cr.	Cele	25		4	96			100	74	
	1960			50		4	96			100	88	85
	1961			25			100			100	87	72
	1962			25			100			100	83	
	1963			25			100			100	90	85
	1966				8	8	84	4		96	82	89
33.8 (Was 225)	1958	Morgan Gulch	Cele	25			100		54	46	88	
	1959			25			100		40	60	90	
	1960			25			100		56	44	89	28
	1961			25			100		40	60	77	34
	1962			25			100		12	88	90	
	1963			25			100			100	86	48
	1964			25			100		4	96	90	61
	1965			25			100		20	80	87	46
	1966						100		28	72	90	39

TABLE 15 - CONTINUED.

Trans. No.	Year	Location	Key Spp.	No. of Plants	Form Class % 1&4	Form Class % 2&5	Form Class % 3&6	Age Class % Y	Age Class % M	Age Class % D	% Use	% D.C.
33.9	1963	Ruby Cr.	Artr						8	92	29	52
	1966								16	84	12	45
33.10	1963	Dry Hollow	Artr	25					36	64	5	32
	1965			25					36	64	64	20
	1966								72	28	4	18
33.11	1963	Bobcat Cr.	Arca	25							72	
	1965			25					60	40	74	10
	1966					48	52		76	24	59	15
33.12	1960	Jakes Canyon	Cele	25			100		44	56	75	
(Was	1961			25			100		28	72	76	38
221 &	1962			50		10	90		44	56	90	27
351)	1963			50			100		40	60	90	
	1965			25			100		84	16	90	23
33.13	1957	Axes Canyon	Cele		48	48	4		84	16	13	
(Was	1958				64	26	10	30	56	4	7	
864)	1959				80	14	6		94	6	4	
	1960				52	40	8		80	20	12	
	1961				26	62	12		66	34	14	17
	1962				8	64	28		78	22	45	11
	1963				58	40	2		92	8	17	
	1966				96	4			80	20	5	10
33.14	1965	Timber Cr.	Chna			42	58		28	72	91	
(Was	1966				4	42	44	12	40	48	83	29
605 & 5S)												
33.15	1962	Powder Gulch	Artr		2	30	46	6	24	48	66	
(Was	1965				2	36	62	2	46	52	80	
602 &	1966						100		48	52	90	30
U-2)	1966	Powder Gulch	Chna			32	68		32	68	72	51
244	1961	Basin Cr.	Cele				100		4	96	84	51
(Was	1962						100			100	90	56
LB-1)	1963						100		2	98	88	
	1964						100			100	90	63
	1965						100			100	88	65
	1966						100			100	88	65

Area 34.

With the browse plants along the nine transects in this unit in only fair to poor condition, the average annual (1962-65) deer harvest of around 340 seems reasonable. It is interesting to note the decline of the mahogany along transect 34.4 (Table 16).

Area 35.

The information collected along the four transects in this unit, leave little doubt as to the condition of the deer winter range. If the harvest is to be increased above the yearly average of 240, considerable improvement of the range will be necessary. Transect data for this area appears in Table 17.

TABLE 16. Browse Transect Information from Deer Winter Ranges, Area 34. 1958-1966.

Trans. No.	Year	Location	Key Spp.	No. of Plants	Form Class %			Age Class %			% Use	% D.C.
					1&4	2&5	3&6	Y	M	D		
34.1 (Was 349)	1960	Cottonwood Cr. Silverstar Cr.	Cele	25	4	44	52		88	12	38	5
	1961			25	4	60	36		88	12	48	12
	1962			25		20	80		96	4	67	
	1963			25		8	92		76	24	45	8
	1965			50	4	48	48		88	12	55	8
	1966			25	12	68	20		92	8	14	10
34.2 (Was 350)	1960	Cottonwood Cr.	Cele	25	12	60	28		88	12	30	7
	1961			25		60	40		92	8	35	10
	1962			25		48	52		96	4	65	
	1963			25		4	96		76	24	27	9
	1965			25		52	48		100	0	22	3
	1966			25	8	76	16		92	8	6	10
34.3 (Was 193)	1958	Hell's Canyon (Low)	Cele	50	30	41	29		76	24	13	
	1959			25	48	36	16		88	12	33	
	1960			25	40	60			88	12	7	9
	1961			25	56	36	8		92	8	10	8
	1962			25	4	88	8		96	4	22	
	1963			25		68	32		88	12	8	
	1965			25	28	64	8		88	12	12	6
	1966			25	48	48	4		92	8	5	11
34.4 (Was 343)	1959	Hell's Canyon (High)	Cele	25	5	85	10		90	10	60	
	1960			25	16	48	36		56	44	31	18
	1961			25	4	28	68		56	44	70	30
	1962			25	4	16	80		64	36	53	
	1963			25	4	20	76		56	44	47	21
	1965			25	4	4	92		40	60	67	37
	1966			25	6	14	80		38	62	55	47
257 (Was 355)	1960	Camp Creek	Cele		6	46	48		86	14	57	7
	1961				2	4	94	4	76	20	58	16
	1962				4	34	62		92	8	55	4
	1966			50	16	46	38	2	88	10	42	11
254 (Was 92)	1961	Soap Gulch	Cele	25		4	96		16	84	60	45
	1962					10	90		14	86	90	47
	1965			25		30	70		68	32	51	23
	1966					64	36		60	40	5	23
212	1965	Soap Gulch	Cele	25	44	52	4		80	20	4	11
	1966			25	44	44	12	4	36	60	2	31
34.5	1966	Dry Creek	Cele	25		8	92	4	56	40	88	24
258 (Was 91)	1961	Opposite Fleecer	Cele	50		4	96		16	84	60	45
	1962			50		10	90		14	86	90	47
	1966			50		4	96		28	72	29	32

TABLE 17. Browse Transects, Area 35. 1958-1966.

Trans.			Key	No. of	Form Class %			Age Class %			%	%
No.	Year	Location	Spp.	Plants	1&4	2&5	3&6	Y	M	D	Use	D.C.
35.1	1963	Colbert Gulch	Cele	25			100		16	84	40	40
(Was	1965			25			100		56	44	90	21
351)	1966			25			100		56	44	73	21
35.2	1960	Pipestone Cr.	Cele	25	8	48	44		88	12	41	8
(Was	1961			25	8	44	48		76	24	46	9
347)	1962			25		40	60		76	24	77	
	1963			25		36	64		72	28	24	10
	1965			25	28	56	16		88	12	24	8
	1966			25	72	24	4		68	32	16	24
35.3	1958	Ratio Mountain	Cele	50	4	4	92		68	32	69	
(Was	1959			45	4	28	68		28	72	58	
247)	1960			50	2	8	90		42	58	80	16
	1961			25		4	96		40	60	78	36
	1962			25			100		24	76	88	
	1963			25			100		12	88	53	41
	1965			25			100		20	80	62	42
	1966			25			100		56	44	69	30
35.4	1958	Galena Gulch	Putr	50	2	12	86		36	64	52	
(Was	1959			50		10	90		22	78	72	
300)	1960			49		10	90		32	68	48	24
	1961			50	2	12	86		60	40	48	18
	1962			50		8	92		20	80	57	
	1963			25		4	96		28	72	46	30
	1965			50		2	98		20	80	76	42

Area 36.

The major deer wintering areas in this unit have had a long history of deer die-offs, and some of the earliest "either sex" deer hunting was also held here. The condition of the plants along the 12 transects is very poor. Table 18 indicates there are few if any young plants along these transects and that on the average over 1/3 of the crown of individual plants is dead. Ranchers still panel haystacks in many sections of the unit as protection against deer depredation. Some method of increasing the deer harvest will eventually have to be devised for the unit if it is to be a deer producer in the future.

Area 37.

Eight years data from transect #37.1 (Table 19) indicates little recovery in the mahogany since 1958. Hunting units with deer ranges in poor condition such as indicated along transect #37.1 cannot be expected to produce many deer under any hunting conditions.

TABLE 18. Browse Transects, Area 36. 1957 - 1966.

Trans. No.	Year	Location	Key Spp.	No. of Plants	Form Class % 1&4	2&5	3&6	Age Class % Y	M	D	% Use	% D.C.
36.1	1957	Jack Creek	Artr	30	16	68	16		72	28	55	
(Was	1958			50	2	44	54		72	28	52	13
398 &	1959			50		34	66		60	40	55	
862)	1960			50	10	46	44		88	12	36	5
	1961			50		20	80		54	46	53	27
	1962			50		16	84		68	32	45	4
	1963			50					42	58	31	20
	1964			50		10	90		30	70	43	
	1965			50		17	83		26	74	67	9
	1966								72	28	28	20
36.2	1960	Jack Creek	Chna	25					100		98	
	1961			25					100		99	
	1966										90	20
36.3	1963	Jack Creek	Artr	25					24	76	51	36
(Was	1964			25		48	52		48	52	58	27
826S)	1965			25		16	84		56	44	80	25
	1966								60	40	46	33
36.4	1960	Burger Creek	Prvi	25		48	52		96	4	26	
(Was	1961			25		52	48		80	20	24	14
357)	1962		Prvi & Amal	25		36	64		24	76	20	
	1964		Prvi	25	5	26	69		37	63	63	41
	1965			25		8	92		38	62	15	37
	1966				16	5	79		37	63	13	39
36.5	1963	Burger Creek	Amal	25	4		96	4	24	72	8	25
(Was	1964			25		22	78		28	72	42	53
364)	1965			25			100		12	88	6	56
36.6 (Was	1963	Cameron Cr. Ridge	Amal	25			100		28	72	38	36
362)	1964			21		4	96			100	52	57
	1965			25			100		28	72	46	61
	1966						100		8	92	30	60
36.7 (Was	1963	Cameron Cr. Ridge	Artr	25		16	84		20	80	25	41
361)	1964			25		12	88		12	88	55	
	1965			25			100		46	54	87	43
	1966						100	4	40	56	44	35
36.8	1963	Bear Cr. Sta.	Amal	25			100		28	72	12	
(Was	1964			24		4	96		24	76	25	
363)	1965			25			100		36	64	29	30
	1966						100		36	64	4	35
36.9	1963	Bear Cr. Sta.	Artr				100		16	84	49	43
	1966						100	16	24	60	32	42
36.10	1958	Indian Cr.	Artr	25		68	32		52	48	64	33
(Was	1959			50		30	70		52	48	65	
168)	1960			25	16	20	64		40	60	59	28
	1961			25		44	56		16	84	43	46

TABLE 18 - CONTINUED.

Trans. No.	Year	Location	Key Spp.	No. of Plants	Form Class % 1&4	2&5	3&6	Age Class % Y	M	D	% Use	% D.C.
36.10	1962	Indian Cr.	Artr	25		24	76		12	88	55	
	1963			25		12	88		12	88	77	56
	1965			24			100		21	79	80	47
	1966			25					8	92	84	64
36.11 (Was 356)	1960	Moose-Squaw Cr	Amal	25	20	52	28		76	24	15	11
36.12 (Was 36.6)	1963	Curlew Cr.	Artr	25		4	96		28	72	20	

TABLE 19. Browse Transect Readings on Deer Winter Ranges, Area 37. 1958-1966.

Trans No.	Year	Location	Key Spp.	No. of Plants	Form Class % 1&4	2&5	3&6	Age Class % Y	M	D	% Use	% Use
37.1	1958	Teboy Spr.	Cele			14	86		50	50	23	
(Was	1959			50		16	84		28	72	37	
262)	1960			23	4	32	64		70	30	43	17
	1961			25		28	72		60	40	24	25
	1962			25		12	88		64	36	33	
	1963			25			100		36	64	13	26
	1965						100		14	86	41	35
	1966			25		16	84		60	40	3	20

Area 38.

The deer winter range in this unit is in poor to very poor condition. This includes areas from Tacoma Gulch east to Johnny Gulch north to McClellan and west to Prickly Pear. Most of the deer winter range in the Limestone Hills shows some potential for recovery. Transects #401 and 402 (Table 20) were established in connection with a one acre exclosure built November 1963 by the Townsend Rod and Gun Club and the Bureau of Land Management. There has been little change in the form class of the plants along the transect outside the exclosure since 1964. Within the exclosure however, there was nearly complete recovery in three growing seasons. There was a difference in the rate of recovery of the plants along transect #402. The transect begins on a rather level piece of ground in the southeast quarter of the exclosure, then runs generally northwest over a small limestone outcrop and down hill. The plants along the first 30-40 feet of the transect on the level ground showed response the first year (1965), but those plants along the limestone outcrop were slower to respond. The information seems to indicate that drastic changes in the extent of deer use in the area will allow the range to recover. The adjacent transect (#401) would imply that little hope for recovery of this range exists with present deer numbers.

Area 39.

The plants measured along transect #317R, 317S and 252 are probably not primary or key winter deer food. Chokecherry and serviceberry in the vicinity of these transects is presently severely overused by deer. It is presumed that at the time these transects were established, rabbitbrush and skunkbrush were the only plants in quantity still in reasonable condition and showing use. The condition of the plants along the eight transects in 1966 (Table 21) would be rated as fair to good. However, the overall aspect of the deer winter ranges, especially from the standpoint of chokecherry, serviceberry and mahogany is poor.

In general there is still the problem of too many deer in Area 39. The ranges will continue to be overused, fawn production will continue to be low and deer harvests will get smaller. Adjustments will have to be made in the deer population now if it is to produce much in the future.

TABLE 20. Browse Transect Readings on Deer Winter Ranges, Area 38. 1958 - 1966.

Trans. No.	Year	Location	Key Spp.	No. of Plants	Form Class % 1&4	Form Class % 2&5	Form Class % 3&6	Age Class % Y	Age Class % M	Age Class % D	% Use	% D.C.
93	1958	Cedar Gulch	Cele				100		62	38	16	
	1959			45		4	96		20	80	37	
	1960			50		14	86		30	70	71	
	1961			50		6	94		46	54	72	29
	1963			50		4	96		48	52	60	21
	1966			50	4	43	53		36	64	73	25
298	1958	Indian Cr.	Cele	25	13		87		13	87	18	
	1959			37		16	84		2	98	43	
	1960			50		12	88			100	50	
	1961			50			100		2	98	56	57
	1962			50			100		4	96	67	
	1963			50			100			100	39	52
	1965			47	7	19	74		28	72	68	44
	1966			28	4	43	53		36	64	63	41
322	1960	Cedar Gulch	Cele	50		20	80		24	76	76	
	1961			50			100		16	84	68	42
	1966			50		40	60		24	76	52	28
327	1960	Cedar Gulch	Cele	50		26	74		26	74	60	
	1961			25		12	88		40	60	68	30
	1963			25			100		16	84	32	38
	1966			25	4	36	60		40	60	55	25
401 (Outside Exclosure)	1964	Limestone Hills	Cele	50		40	60	12	28	60	83	39
	1965			50		46	54		30	70	90	37
	1966			50	14	50	36		42	58	77	28
402 (Inside Exclosure)	1964	Limestone Hills	Cele	50		60	40	2	38	60	Tr.	26
	1965			50	64	32	4		48	52	0	24
	1966			50	98	2			54	46	0	17

TABLE 21. Browse Transect Readings on Deer Winter Ranges, Area 39. 1958-1966.

Trans. No.	Year	Location	Key Spp.	No. of Plants	Form Class % 1&4	Form Class % 2&5	Form Class % 3&6	Age Class % Y	Age Class % M	Age Class % D	% Use	% D.C.
Not Numbered	1965	Avalanche Gulch	Cele	25	4	12	84		28	72	86	42
	1966			25	4	48	48		20	80	67	38
310	1960	Haw Gulch	Putr	50	2	48	50		12	88	58	
317R	1960	Duck Creek	Chna	25					64	36	50	
	1961			25							17	
	1962			25		4	96		8	92	83	
	1966			25	44	56			32	68	54	33

TABLE 21 - CONTINUED.

Trans. No.	Year	Location	Key Spp.	No. of Plants	Form Class % 1&4	2&5	3&6	Age Class % Y	M	D	% Use	% D.C.
317S	1960	Duck Creek	Rhtr	50		22	78		34	66	18	
	1961			50		2	98		8	92	16	
	1962			50		14	86		8	92	10	
	1963			50		32	68		12	88	9	
	1966			50	46	54			8	92	12	52
252	1958	Deep Creek	Rhtr	25	24	56	20		40	60	20	
	1959				8	84	8			100	24	
	1960					72	28		48	52	55	
	1961					48	52		48	52	9	
	1962					56	44		40	60	9	
	1963					84	16		44	56	4	
	1966				40	48	12		8	92	29	54
252S	1963	Duck Creek	Artr	25		48	52		76	24	49	6
	1966			25	36	64		8	64	28	65	15
392	1963	White Gulch	Putr	25			100		20	80	65	40
	1964					36	64		12	88	69	43
	1965					40	60		20	80	90	52
	1966				12	84	4		12	88	44	45
393	1963	White Gulch	Putr	25			100		20	80	70	40
	1964					4	96		24	76	88	51
	1965				8	44	48		24	76	89	41
	1966				16	84			20	80	44	44

Areas 310 and 311.

The major influence in Area 310 is elk as far as range is concerned. Little progress in range recovery can be accomplished until the elk problem is resolved. There is little deer winter range in area 310, however.

In Area 311, the deer winter range is limited. On several deer winter areas (Dudley-Deer Creeks) Mountain Sheep and elk complicate the over-use problem. The deer winter ranges lying along the foothills from the mouth of Gallatin Canyon to Bear Canyon although not extensive, are in poor condition. Deep snow and hunter access further complicate the management program. In the Sourdough Creek (Bozeman Creek) drainage, moose and elk are also causing some range problems but the area is not open to hunting. A special use permit granted to the City of Bozeman by the U. S. Forest Service for municipal water supply specifies the area be closed to public use. The following information indicates general deer winter range condition:

Trans. #	Year	Location	Key Spp.	No. Plants	Form Class % 1&4	2&5	3&6	Age Class % Y	M	D	% Use	% D.C.
-	1963	Swan Creek	Salix	25	0	24	76	0	96	4	47	-
-	1963	Dudley Cr.	Artr	25					28	72	23	35
63	1958	Spanish Cr.	Artr	26	60	32	8	4	80	16	22	-
	1959			50	26	72	2	2	78	20	21	
	1960			50	30	58	12	-	70	30	39	

Area 312.

Essentially, this hunting unit had a deer buildup in the early to mid-50's followed by a decline in both deer and deer winter range. Wilkins discussed this sequence to some extent in the Journal of Wildlife Management (Vol. 21 No. 2, April 1957 pp. 159-169). The two deer either sex hunting seasons inaugurated by the Fish and Game Department for this area in 1952 and later were not only inadequate but were initiated too late to halt extensive range deterioration by the deer. This situation also occurred in many of Montana's hunting units. Table 22 presents information for several deer browse species along eight transects and from two exclosures. The Bitterbrush range for the most part is decadent. Serviceberry in the vicinity of transects 826, 827S and 827B is in very poor condition. The Bitterbrush plants in Blacktail Creek (transect #336) have shown some recovery but that area receives more snow than near Armstrongs. Hunting unit 312 does not now have the deer it had About 10-15 years ago. It also does not have the volume or quality of winter deer food it had 10-15 years ago. Unit 312 has most of the ear marks of a typical "deer buildup-deer decline" sequence. Presently the hunting public would like to see more restrictive hunting seasons in the area. To follow this suggestion, would simply result in a deer buildup (although of less magnitude than of 10-15 years ago) far in excess of what the present deteriorated range could stand. Presently the range still has possibilities for recovery provided the population is reduced.

TABLE 22. Browse Transect Readings on Deer Winter Ranges, Area 312. 1957 - 1966.

Trans. No.	Year	Location	Key Spp.	No. of Plants	Form Class %			Age Class %			% Use	% D.C.
					1&4	2&5	3&6	Y	M	D		
321	1960	Middle Fork 16-Mile	Putr	50		26	74		16	84	23	
	1966			38	50	50			32	68	3	38
332	1960	Nixon Gulch	Cele	50		10	90		6	94	23	
	1966				8	78	14	2	54	44	3	20
336	1960	Blacktail Cr.	Putr	50			100		2	98	36	
	1965				26	78	6		12	88	6	46
400S	1959	Brackett Cr.	Amal	25		12	88		16	84	64	
	1960					24	76			100	47	
	1961					4	96		100		31	70
	1965					56	36		28	64	47	38
	1966				36	52	4			100	7	42
400B	1959	Brackett Cr.	Putr	25		4	96		68	32	32	
	1960					24	76		12	88	66	
	1961						100		100		53	73
	1965				8	16	76		28	72	77	52
	1966				8	28	60		28	68	70	42
826	1957	Armstrong	Putr	25			100		42	58	71	
	1958			150		19	81	1	26	73	61	
	1959			25		16	84		36	64	70	
	1960			50	2	20	78		42	58	80	
	1965			25		16	84		4	96	89	59
	1966			25		20	80		4	96	75	55
827S (Was 827)	1959	Armstrong	Artr	25		32	68		48	52	67	
	1960			25		36	64		52	48	75	
	1965			25	4	24	72		36	64	90	46
	1966			25	8	76	16		48	52	75	25

TABLE 22 - CONTINUED.

Trans. No.	Year	Location	Key Spp.	No. of Plants	Form Class % 1&4	Form Class % 2&5	Form Class % 3&6	Age Class % Y	Age Class % M	Age Class % D	% Use	% D.C.
827B	1957	Armstrong	Putr	25			100		52	48	33	
(Was	1958			50		12	88		44	56	59	
827)	1959			25		28	72		20	80	28	
	1960			50	2	22	76		22	78	73	
	1965			50	2	20	78		20	80	82	34
	1966			50		52	48		6	94	81	52
Excl. 3	1957	Armstrong	Putr			23	77	14	59	27	0	
(5 yds.	1958				100			8*	72	16	0	
N of Trans.												
#827B)												
Excl. 4	1957	Armstrong	Putr			13	87		29	71	0	
(50 yds.	1958				100			4	48	48	0	
W of Trans.												
#826)**												

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* Seedlings 4%

** Exclosure erected in September, 1955.

Areas 313, 314, 315, 316 and 317.

Table 23 presents range information from these several areas. Hunting unit 316 is a mountainous area with little if any deer winter range.

TABLE 23. Browse Transect Information, Areas 313, 314, 315 and 317. District Three.

Trans. No.	Year	Location	Key Spp.	No. of Plants	Form Class % 1&4	Form Class % 2&5	Form Class % 3&6	Age Class % Y	Age Class % M	Age Class % D	% Use	% D.C.
Area 313												
233	1958	Travertine	Artr	25	48	40	12	16	60	24	1	
	1959	Flats		50	24	74	2		58	42	12	
	1960			50	30	58	12		58	42	2	
304	1960	Decker Flats	Artr	50		46	54		42	58	57	
Area 314												
334	1960	Strickland Cr.	Artr	25	8	32	60		44	56	19	
33R	1958	Big Creek	Rhtr	25		32	68		28	72	36	
	1959			25		56	44		56	44	62	
	1960			25		20	80		28	72	63	
Area 315												
333	1958	Horse Creek	Prvi	25	8	32	56		72	28	44	
	1959				20	72	8		72	28	38	
	1960					36	64		20	80	48	
	1965				4	32	64		24	76	17	34
	1966			14 (11 dead)	14	50	36		7	93	61	56
333	1965		Amal	25	12	8	80	4	4	92	14	66
Area 317												
309	1960	Mill Creek	Rhtr	25		12	88		68	32	74	-
F. S.		Mill Creek	Prvi	25	36	28	36	20	68	12	54	-

Area 318.

As shown in Table 24 there are nine transects on mountain mahogany and bitterbrush on the deer winter range north and east of Butte in Area 318. Most of the area is private land and much of the winter range is posted. Local people speak of great numbers of deer in the past and browse condition indicates an over population of deer at one time. There is still much highlined Rocky Mountain Juniper in Brown's Gulch. The transect readings indicate a trend of improvement in browse condition with declining utilization.

There are several factors that complicate deer management on this winter range. First, the large amount of posted private land. Second, heavy to severe grazing by domestic stock which may compete with deer for available browse, especially the bitterbrush. The following indicates the effect domestic stock have on bitterbrush. Heavy grazing pressure by domestic stock may have a pronounced effect on the condition and utilization of bitterbrush. On May 11, 1965, a definite fence line contrast was observed on bluebunch wheatgrass along a fence line in Brown's Gulch, on deer winter range, at transect No. 253. The transect line crosses the fence with 25 tagged plants on one side and 25 on the other. The bitterbrush plants were evaluated in light of the fence line contrast on bluebunch wheatgrass.

FENCE LINE
CONTRAST

"Better-Looking" Agsp
LIGHTER GRAZING PRESSURE BY LIVESTOCK

Tagged Plants 1-25 Putr

Form Class %			Age Class %		%	%
1	2	3	M	D	D.C.	Use
4	48	48	76	24	16	61

"Less" Agsp
HEAVIER GRAZING PRESSURE BY LIVESTOCK

Tagged Plants 25-50 Putr

Form Class %			Age Class %		%	%
1	2	3	M	D	D.C.	Use
0	20	80	64	36	25	83

At transect #248 in Area 318, too steep for livestock use, an excellent grass cover was found despite heavy deer usage on browse.

From observations made on the deer winter range, it appears that deer will select mountain mahogany over bitterbrush in this area when both species are equally available. Elk are in the area but usually at higher elevations than the deer winter range.

Area 319.

There are serious problems on all deer winter ranges in Area 319 as indicated by the 13 browse transects in the area on mountain mahogany, bitterbrush and sagebrush. Dead crown on these three species, for all transect readings, have averaged; mountain mahogany - 45%, bitterbrush - 33% and sagebrush - 42%.

Apparently hunters have not been able to harvest deer in sufficient numbers from Area 319 during the regular hunting season. By re-opening Area 319 during late December, January and February, deer could be more easily removed when they are on the winter range.

One of the two important deer winter ranges in Area 319 is in High Rye. Five transects on bitterbrush in High Rye shows that utilization is increasing and the bitterbrush is deteriorating at an alarming rate. The other deer winter range, from Jerry Creek to Dicky Bridge on the north side of the Big Hole River is in a most deteriorated condition. Deer are exceedingly numerous on the winter range and are destroying even the sagebrush cover. The mahogany is in such terrible condition, deer have apparently shifted onto sagebrush and are systematically destroying that. Rocky mountain juniper and Douglas fir are highlined. Usage of undesirable browse plants has been observed. Deer production is low. During the winter of 1962-63, 44 fawns:100 adults was recorded. During the following winter 1963-64, 40 fawns:100 adults was recorded.

Much of the sagebrush in the area between Jerry Creek and Johnson Creek appears to be a mixture of big sage (Artemisia tridentata) and low sage (Artemisia arbuscula). It may be that the low sage is a more acceptable species for deer. Large numbers of deer have been observed on these sagebrush ranges during aerial winter elk surveys.

There has been, and is, terrible land and resource abuse north of the Big Hole River between Jerry Creek and the Dicky Bridge by domestic stock, deer and elk.

Table 25 presents information from all browse transects in Area 319. At transect #207 on Jerry Creek, severe use on rabbitbrush was observed during the winters of 1962-63 and 1964-65. At transect #223, Johnson Creek, severe use was observed on big sagebrush. Horsebrush and rabbitbrush were also browsed. At High Rye, transect #237, deer use of new green grass was observed on May 11, 1965. At transect #238, severe cattle use, in the past, has damaged bitterbrush. At transect #240 deer usage of new, green grass was observed May 11, 1965. Deer are abundant in the High Rye area during the winter.

Table 26 shows information for canopy-coverage of sagebrush on the deer winter range north of the Big Hole River.

TABLE 24. Browse Transect Information, Area 318. 1958 - 1966.

Trans.			Key	No. *	Form Class %			Age Class %			%	%
No.	Year	Location	Spp.	Plants	1&4	2&5	3&6	Y	M	D	Use	D.C.
226	1964	E. of Opportunity	Putr	50		22	78		38	62	84	38
	1965				6	52	42		74	26	45	18
	1966					28	72		70	30	71	19
247 (Was #90)	1961	Hail Columbia Gulch	Putr		16	48	36		60	40	2	22
	1964			50	14	72	14		54	46	26	25
	1965				22	58	20		92	8	17	10
	1966				26	72	2		94	6	2	12
248	1964	Hail Columbia Gulch	Putr	50	16	56	28		28	72	63	31
	1965				12	52	36		74	26	35	18
	1966				4	88	8		76	24	28	19
249	1964	Hail Columbia Gulch	Putr	50		34	66		26	74	70	36
	1965				8	62	30		76	24	36	17
	1966				4	66	30		60	40	23	24
250	1964	Hail Columbia Gulch	Cele	50			100		16	84	90	41
	1965						100		82	18	40	22
	1966					36	64		48	52	1	34
251	1964	Brown's Gulch	Putr	50		26	74		40	60	78	42
	1965						100		66	34	88	30
252	1964	Brown's Gulch	Cele	50	4	26	70		74	26	--	20
	1965				27	28	45		88	10	62	14

TABLE 24 - CONTINUED.

Trans. No.	Year	Location	Key Spp.	No.* Plants	Form Class % 1&4	2&5	3&6	Age Class % Y	M	D	% Use	% D.C.
253	1964	Brown's Gulch	Putr	50	18	54	28		74	26	--	17
	1965				2	34	64		70	30	72	21
281	1958	Meadow Gulch	Putr	--		12	88	7	14	4	51	
	1959				2	22	76		52	48	71	
	1960				4	24	72	4	96		46	18
	1961					6	94	50	50		59	26
	1962					32	68	2	52	46	74	24
Survey Vicinity of #247 & #248												
	1964	Hail Columbia Gulch	Cele				100		23	77	90	31

* At each transect (Except Meadow Gulch) 50 plants were tagged July, 1964.

TABLE 25. Browse Transect Readings on Deer Winter Ranges in Area 319. 1958-1966.

Trans. No.	Year	Location	Key Spp.	No. Plants	Form Class % 1&4	2&5	3&6	Age Class % Y	M	D	% Use	% D.C.
206 (was 346)	1960	Charcoal Cr.	Cele		4	8	88	4	64	32	64	25
	1961					4	96		48	52	20	35
	1962					24	76		44	56	88	37
	1963						100		44	56	68	
	1964			50		8	92		36	64	85	46
	1965			Tagged			100		40	60	90	35
	1966					18	82		38	62	52	40
208	1963	Jerry Creek	Cele				100		8	92	87	
	1964			50			100			100	90	88
	1965			Tagged			100		3	97	90	61
	1966					16	84		34	66	67	39
237 (Was HR-1)	1961	High Rye	Putr			16	84		86	14	52	9
	1962					70	30		82	18	55	10
	1963				2	60	38		68	32	71	
	1964					40	60		70	30	63	18
	1965					18	82		66	34	90	21
238 (Was HR-2)	1961	High Rye	Putr				100		20	80	61	44
	1962					52	48		28	72	63	38
	1963					16	84		44	56	75	
	1964					36	64		44	56	78	34
	1965						100		24	76	90	43
	1966					10	90		48	52	69	29
239 (Was HR-3)	1961	High Rye	Putr			2	98		38	62	62	30
	1963				2	6	92		72	28	22	
	1964					2	98		2	98	90	43
	1965						100		64	36	90	23
	1966						100		40	60	81	35
240 (Was HR-4)	1961	High Rye	Putr				100	2	26	72	65	39
	1962				4	24	72		34	66	63	32
	1964					10	90		10	90	82	48
	1965						100		60	40	90	27
	1966					4	96		36	64	76	40

TABLE 25 - CONTINUED.

Trans. No.	Year	Location	Key Spp.	No. of Plants	Form Class % 1&4	2&5	3&6	Age Class % Y	M	D	% Use	% D.C.
241	1961	High Rye	Putr			4	96		38	62	57	33
(Was	1962					34	66		50	50	70	25
HR-5)	1964					6	94		2	98	90	55
	1966						100		16	84	84	50
207	1958	Jerry Creek	Artr		4		96		52	48	49	30
(Was	1959					22	78		32	68	78	
100)	1960				4	28	68		44	56	57	37
	1961					16	84		20	80	55	50
	1962				4	36	60		28	72	76	41
	1963					8	92		32	68	77	
	1964			50		12	88		48	52	88	37
	1965			Tagged		14	86		52	48	88	32
	1966				10	56	34		58	42	37	33
225	1963	Dickey Bridge	Artr			48	52		64	36	9	
227	1964	Jerry Creek	Artr &	50		12	88		28	72	74	49
	1965		Arar	Tagged		10	90		56	44	55	33
	1966				2	32	66		66	34	7	25
Survey	1964	Jerry-Jimmie New Creeks	Artr &	25		28	72		32	68	57	43
228	1964	Jimmie New	Artr &			4	96		28	72	89	62
	1965	Creek	Arar			2	98		44	56	83	43
223	1964	Johnson Cr.	Artr			10	90		20	80	78	56
	1965					6	94		36	64	72	48
224	1964	Johnson Cr.	Artr			2	98		24	76	57	55
	1965					4	96		40	60	53	42
	1966					40	60		44	56	11	39

TABLE 26. Canopy-Coverage Data on Sagebrush, on Deer Winter Range, North of Big Hole River. Area 319.

Transect No.	Date	Location	Spp.	No. of 2x5 dm Plots	Avg. Ht. Sage (in.)	Dead [1] Crown	Living Crown	Ttl. Crown	% D.C.	Avg. % Use 1964-65
224	5/12/65	Johnson Cr.	Artr	40	11	7/38 [2]	13/48	Not Measured	35 [3]	55
227	5/13/65	Jerry Creek	Artr & Arar	40	15	8/38	14/48	22/50	36	65
228	5/13/65	Jimmie New Cr.	Artr & Arar	40	10	9/25	6/40	13/43	60	86

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[1] Dead crown plus living crown will not equal total crown, because of wide estimation classes. Dead, living and total were estimated separately.

[2] 7/38 first figure is average percent canopy-coverage. Second figure is percent frequency of occurrence.

[3] Percent dead crown is found by adding dead and living crown then computing percentage that is dead. It compares relatively well with our estimations of dead crown.

Area 320.

With a few exceptions, the deer winter range in this area is in very poor condition. As is the case with many of District Three winter ranges, most plants are decadent and there are few if any new plants coming in. It would appear that when the older plants die, the species will be almost non-existent in the area. There is little question, that recovery on these ranges will be a fairly long process. There are far too many deer on these ranges now and any increase in their numbers will only result in the range conditions getting worse. Table 27 shows that of ten transects, mahogany along eight of them is severely overused.

TABLE 27. Browse Transect Data, Area 320. 1959 - 1966.

Trans.			Key	No. of	Form Class %			Age Class %			%	%
No.	Year	Location	Spp.	Plants	1&4	2&5	3&6	Y	M	D	Use	D.C.
320.1	1961	S. Willow	Putr	25		8	92		36	64	37	
	1963	Potosi		25			100		12	88	72	32
	1965			25			100		12	88	85	59
	1966			25			100		12	88	86	51
320.2	1961	Ramshorn Cr.	Cele	25		8	92		28	72	41	
(Was	1963			25			100		28	72	77	37
376)	1965			25			100		44	56	88	25
	1966			25			100		32	68	86	40
320.3	1960	Mill Creek	Cele	25	4	8	88		80	20	85	3
(Was	1961			25			100		56	44	89	28
341)	1963			25			100		32	68	81	30
	1965			25			100		4	96	90	64
	1966			25			100		24	76	90	52
320.4	1960	Goodrich-Dry	Cele	25			100		24	76	83	46
(Was	1961	Gulch		25			100		4	96	88	46
344)	1963			25			100		4	96	75	43
	1965			25			100		20	80	88	53
	1966			25		4	96		20	80	51	47
320.5	1963	Bear Creek	Cele	25			100		4	96	49	38
	1965	(low)		25			100		28	72	90	44
	1966			25			100		28	72	32	49
320.6	1959	Bear Creek	Cele	25		8	92			100	59	
(Was	1960	(high)		25			100		40	60	72	33
342)	1961			25			100		20	80	69	41
	1963			25			100		12	88	42	34
	1965			25			100		28	72	90	31
	1966			25			100		48	52	34	28
320.7	1961	Hulbert Gulch	Cele	25			100		24	76	84	39
(Was	1966			25		4	96		40	60	76	40
377)												
320.8	1958	Gold Hill (low)	Cele		35	39	26		89	11	19	
	1959			22	8	56	36		24	76	30	
	1960			25		72	28		100		33	3
	1961			25	4	28	68		92	8	41	11
	1963			25		48	52		60	40	3	12
	1965			25	20	60	20		88	12	18	7
	1966			25	40	32	28	4	92	4	18	6

TABLE 27 - CONTINUED.

Trans. No.	Year	Location	Key Spp.	No. of Plants	Form Class % 1&4	2&5	3&6	Age Class % Y	M	D	% Use	% D.C.
320.9	1959	Gold Hill (high)	Cele	25	4	88	8		100		52	
	1960			25	4	76	20		100		22	2
	1961			25		52	48		96	4	48	96
	1963			25		80	20		92	8	1	3
	1966			25	8	64	28		84	16	2	7
320.10	1966	Dry Georgia Gulch	Cele				100		56	44	89	34

Area 361.

This area has little deer winter range because of terrain and vegetation. However, information from transect #310.11 in Sheep Creek indicates that in 1963, the twenty-five serviceberry plant along the transect were in very poor condition. Ninety-six percent were in Form Class 3 with only 4% in Form Class 2. It also indicates no young plants were found along the transect and that 40% of the plants were mature and 60% decadent. In 1963 there was an indication that 40% of the current (1962) leaders had been used.

In summary, the winter deer ranges in District Three, with a few exceptions, are in poor to very poor condition. Present deer numbers on these ranges are sufficient to keep the condition and trend moving downward. In most instances the number of deer is less than that of 10-15 years ago. The two-deer either sex seasons have not checked the downward trend of deterioration on the winter ranges. Perhaps the seasons were an example of "too-little" "too-late". Perhaps instead of two deer bag limits, they should have been 8 or 10 deer bag limits. Perhaps instead of season being held in October and November they should have been held in January. However, it is not too late to bring about conditions conducive to recovery of these deer ranges, but the recovery now will take considerable time. It will also be more difficult to obtain public acceptance of the program.

If Montana is to bring its winter deer ranges up to full production, drastic reduction must be made of present deer numbers, and the deer kept at these levels (lower than now) until the ranges are definitely recovering. There are no apparent alternatives to this program.

There is undoubtedly need for improving the present methods of evaluating condition, trend and utilization of deer browse ranges. Our present methods give only a minimum of information. There is also reason to believe that present methods would be inadequate when maximum deer numbers are produced on ranges at maximum production.

To improve presently employed methods (on presently deteriorated ranges), the following suggestions are offered as possibilities. Plot, using aerial photos, the location and acreage of deer winter ranges. By aerial flights, some determination of deer distribution and/or use should be made. These distributions could be given some relative index rating. Establishing an order for the winter ranges as to which receives the heaviest use. The index and order should be correlated with weather. Determine important browse species and measure density of browse cover. Also record condition and utilization of browse on each wintering area. Determine browse production on each wintering area. At least in the beginning, clipping will be necessary. It will be necessary to get trends in production. Consider weather and growing conditions. Correlate production trends with deer density ratings mentioned above.

Check land status (ownership) of all deer winter ranges (under multiple use concept, deer should have the first priority on "key" deer winter range). Determine browse and deer potential for the hunting areas, if possible. It should be figured roughly how much browse a deer needs and how much browse the area produces. Potential browse production can be obtained from exclosures or similar areas in good condition (i.e., Axes Canyon.) Consideration should be given the possibility that areas lightly or properly browsed may produce more forage than that indicated in an exclosure.

If condition and production decreases and utilization of the key browse increases on deer winter ranges without livestock present, there are too many deer, regardless of numbers. A norm should be set for some degree of browse production, condition and utilization; when this is exceeded start removing deer. If hunters can not take them during the regular hunting season, reopen the winter range areas when deer can be more easily removed. Reopenings may be a better answer, than a two-deer limit, for certain hunting areas.

Prepared by Joseph L. Egan Approved by Wynn Freeman

Date: July 19, 1967

S
639.9
W-73-R-11
A-1 (Antelope, etc)
1966

STATE DOCUMENTS

JOB COMPLETION REPORT
INVESTIGATIONS PROJECT

State of Montana
Name: Wildlife Investigations - District Three
Project No. W-73-R-11
Title: Big Game Survey & Investigations - Antelope, Bighorn, Sheep, Mountain Goat, Moose
Job No. A-1
Period Covered July 1, 1965 to June 30, 1966

ABSTRACT:

Aerial antelope surveys were conducted in 7 of the 12 antelope hunting areas in District Three during the report period. In Area 33, there was an indicated 68% decrease of antelope observed in 1965 compared to 1964. Comparable surveys for the other 6 areas for previous years is not available.

Comparisons of antelope harvests for the years 1960 to 1965 is presented. The 1965 and 1964 harvests are similar (2971 and 2908 respectively). District-wide, permits issued have steadily increased from 1376 available in 1960 to 4558 available in 1965. The number of antelope harvested has also steadily increased from 1960 (1121) to 1964 (2908). Hunter success on the other hand was 89% in 1960 and 71% in 1965. The hunter success has not changed in the same proportion that harvest and permits issued have during the years 1960-1965. Information from antelope checking stations, which includes age structure and weight data, is presented.

Mountain goat and sheep harvest information is compared with previous years data. Hunter success and number of goats harvested in Area 312 increased from 1964 but decreased in Area 313. In the case of Mountain Sheep, the number of hunters decreased from 1964, but their success increased while the harvest remained approximately the same.

The overall hunter success for Moose permit holders has shown some decline based on the numbers of permit holders hunting. The number of permits issued has declined from 505 issued in 1962 to 345 issued in 1965.

Bear harvest as determined from the postal questionnaires is presented for the years 1963, 1964 and 1965.

OBJECTIVES:

To obtain quantitative data for the management of big game populations. Data will be from range surveys, population trend surveys, hunter surveys and supplemental studies. Results of surveys and investigations will be presented by management units. Management units are at present defined as the district management units described on the hunter map.

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PROCEDURES:

1. Range Surveys.

   a. Range surveys will be conducted according to standardized procedures described in the Department's Range Survey Guide.

   b. Supplemental range surveys, using other than the Department's standard procedures, may also be conducted where needed.

2. Population Trend Surveys.

   a. Trends in population size will be determined by methods applicable to species.

   b. Trends in population productivity and rates of increase will be determined from herd composition data.

   c. Trends in population mortality will be determined by appropriately spaced adult-young ratio counts or dead animal counts on sample plots.

3. Hunter Harvest Surveys.

   a. A statewide questionnaire will be used to determine the hunter success and numbers of animals harvested on a statewide, district and management unit basis.

   b. Checking stations will be used where supplemental harvest information and biological data are desired.

4. Supplemental Studies.

   a. Food habits and forage preferences will be investigated by feeding site examinations and/or rumen analyses. Rumen analysis will be conducted by the State Fish and Game Laboratory.

   b. Movements within home ranges and migratory habits will be investigated by the use of marked and/or tagged animals.

   c. Relationships to domestic livestock or agricultural crops will be investigated by methods applicable to the situation.

FINDINGS:

ANTELOPE

Aerial antelope surveys were conducted in Areas 33, 36, 37, 38, 311, 320 and 350 during the report period. Survey data appears in Table 1. Comparison of these area surveys with those of past years is presented in Table 2. There is a noticeable decline in the number of antelope observed in Area 33 during the report period (1965-66) as compared to observations made in 1964 and 1962. The specific areas within hunting unit 33 where changes were apparently the greatest is shown in Table 3. The information in Table 4 indicates some shifting or dispersion on the winter range between February and March 1966. That the antelope were not readily visible during the February count is a possibility. The schedule of aerial surveys of various antelope areas during the past six report periods is given in Table 5.

TABLE 1. Antelope surveys - District Three, 1965-1966.

Location	Date of Survey	Number of Antelope observed					M/100F	Fwn/100F	Fw/100Ad.
		M	F	Fwns	Unc	Total			
Area 33	10-12-65								
Red Rocks Refuge						300			
Sandhills N. of Refuge						90			
Centennial Valley						697			
Sub Total						1087			
Basin&Sage Creeks						29			
Total						1116			
Area 33	2-25/26-66								
Armstead-Dell						47			
Sage Creek						409			
Basin Creek						0			
Dell-Lima-Lima Res.						123			
Lima-Monida						138			
N. Lima Res.						0			
Total						717			
Area 33	3-4-66								
W. Side Upper Sage Cr.						32			
E. Side Upper Sage Cr.						276			
Little Sage Cr.						274			
Dell-Lima						38			
Lima-Monida						130			
Total						750			
Area 36	7-14-65								
Short Cr.-Jack Cr.		22	88	52	-	162			
Jack Cr.-Wolf Cr.		56	119	100	-	275			
Wolf Cr.-Quake L. Hwy		11	15	3	-	29			
Norris-Ennis		1	8	3	-	12			
Ennis-Wall Cr.		15	135	104	-	254			
Total		105	365	262	-	732	29	72	56
Area 37	7-13/15/16-65								
Highway 10-Missouri R.		3	10	13	-	26			
Mont. 281-U.S. 10-Mont. 287-Kamps Rd. West		22	57	41		120			
Toston-Radersburg and Kamps Rd. West		9	23	10		42			
W. of Mont. 281		21	43	29		93			
Elkhorn Basin		7	5	-		12			
Central Area		9	31	16		56			
Total		71	169	109		349	37	67	49
Area 38	7-19-65								
Limestone Hills-Radersburg		14	29	20		63			
Limestone Hills		-	1	1		2			
Townsend Flats		19	41	30	4	94			
SE Corner 38		6	14	7		27			
Total		39	85	58	4	186	46	68	47

TABLE 1 - CONTINUED.

Location	Date of Survey	Number of Antelope observed					M/100F	Fwn/100F	Fw/100Ad.
		M	F	Fwns	Unc	Total			
Area 311	7-24/25-65								
N. Norris Cutoff-W. Madison River		67	136	97	4	304			
Horseshoe Hills		16	19	13	-	48			
Total		83	155	110	4	352	53	71	38
Area 320	7-13-65								
Gold Hill-Coal Creek		1	6	8	-	15			
Coal Cr.-Goodrich Gulch		14	15	9	-	38			
Goodrich Gulch-Alder		8	36	26		70			
Gold Hill-So. Boulder		3	16	11		30			
So. Boulder-Harrison		2	15	10		27			
Harrison-Ennis		2	19	13		34			
Total		30	107	77		214	26	66	52
Area 350	7-13-65								
E. Whitehall-Boulder Rd.		8	29	30		67			
W. Whitehall-Boulder Rd.		6	21	15	-	42			
Total		14	50	45		109	26	90	71

TABLE 2. Antelope survey and hunting season information by hunting area.

Hunting Area	Years					
	1960	1961	1962	1963	1964	1965
30						
Census		1912	1634	955 1/	1796	-
Permits	200	604	601	601	601	601
Percent Success *	87	85	85	79	78	71
Kill	169	460	477	437	456	399
31						
Census			938		1512	-
Permits	150	149	250	250	353	352
Percent Success	90	81	72	73	78	84
Kill	117	110	167	179	259	278
33 2/						
Census		1935	2694		3546	1116
Permits	501	901	1201	1500	2000	2502
Percent Success	93	79	82	81	73	61
Kill	422	622	866	1045	1278	1309
34						
Census	-	-	-	274	-	-
Permits	30	30	30	30	31	30
Percent Success	80	80	88	85	79	79
Kill	24	24	26	23	23	23

TABLE 2 - CONTINUED.

	Years					
Hunting Area	1960	1961	1962	1963	1964	1965
36						
Census	-	466	-	-	-	732
Permits	77	200	201	201	258	250
Percent Success	92	82	76	71	80	88
Kill	66	159	138	134	85	199
37 3/						
Census			514			349
Permits			150	150	200	101
Percent Success			91	88	63	78
Kill			137	132	125	77
38						
Census			298			186
Permits	51	75	77	75	75	50
Percent Success	90	93	94	93	85	71
Kill	46	65	69	63	62	32
39 4/						
Census						
Permits	28	25				
Percent Success	67	100				
Kill	11	19				
311						
Census	-	192	-	-	-	352
Permits	40	40	40	40	80	100
Percent Success	100	72	89	97	86	82
Kill	35	29	35	37	69	77
320						
Census	-	-	-	189 5/	-	214
Permits	61	61	75	75	100	51
Percent Success	82	82	76	84	75	79
Kill	50	46	54	59	72	37
339						
Census	-	-	-	833	1072 6/	-
Permits	152	153	151	200	301	350
Percent Success	85	89	92	94	88	84
Kill	125	123	134	164	256	294
340						
Census	300	-	453	-	298	-
Permits	36	125	125	125	150	151
Percent Success	100	96	90	96	76	71
Kill	31	115	113	120	108	104

TABLE 2 - CONTINUED.

Hunting Area	Years					
	1960	1961	1962	1963	1964	1965
350						
Census	-	211	72 7/	-	-	109
Permits	50	25	20	20	20	20
Percent Success	62	100	47	44	83	42
Kill	25	25	9	8	15	8
Totals						
Permits	1376	2388	2921	3267	4160	4558
Percent Success	89	83	83	83	73	71
Kill	1121	1797	2250	2456	2908	2971

* Based on number of hunters hunting.
1/ Partial survey -- area from Armstead to Monida not included. Figure for area censused was comparable to 1962 figure for the same area (1069).
2/ Winter surveys - figures do not include fawn crops. (Except 1965 partial summer survey)
3/ Area 37 was initiated in 1962 from a part of Area 38.
4/ Area 39 was discontinued in 1962 and was made a part of Area 38.
5/ West half only.
6/ Part of 339 transferred to 311.
7/ Only Whitetail Creek area - figure is comparable to 1961 census for the same area (80).

TABLE 3. Comparison of antelope observed in the Dell-Lima-Monida Area 1964 and 1966.

Location	Number Antelope Observed *	
	June 1964	February 1966
Armstead - Dell	124	47
Sage Creek	2104	409
Basin Creek	245	0
Dell-Lima-Lima Reservoir	146	123
Lima - Monida	150	138
N. Lima Reservoir	400	0
Total	3169	717

* Aerial Survey.

TABLE 4. Comparison of antelope observed in the Dell - Lima - Monida Area, February 1966 and March 1966.

	Number Antelope Observed *	
Location	February 1966	March 1966
Upper Sage Creek-West Side	0	32
Upper Sage Creek-East Side	409	276
Little Sage Creek	0	274
Dell - Lima	123	38
Lima - Monida	138	130
Armstead - Dell	47	**
Totals	717	750

* Aerial Survey.

** Not flown in March.

TABLE 5. Schedule of aerial antelope surveys - District Three.

	Years Surveyed			(marked by x)		
Area	1960	1961	1962	1963	1964	1965
30		x	x	x	x	
31			x		x	
32	Established in 1966 - formerly part of 33					
33		x	x		x	x
34				x		
36		x				x
37			x			x
38			x			x
311		x				x
320				x (W 1/2)		x
339	x			x	x	
340	x		x		x	
350		x	x			x

In order to meet printing deadlines for the publication of the Special Big Game Season hunting map which contains antelope hunting areas and season dates, a tentative antelope permit quota is submitted. However, aerial surveys are not conducted until after these tentative quotas are submitted. Upon completion of the aerial surveys and the assimilation of other pertinent information, quotas are altered if necessary prior to the issuance of the permits. Applications for permits are usually made on the basis of the tentative quotas as published on the hunting season map. The quotas and applications for 1965 by area are given in Table 6. The antelope harvest is determined by postal questionnaire using a twenty or one hundred percent sampling rate.

The sampling rate and sample size are also shown in Table 6. For the 1965 hunting season, 4165 resident permits were issued (Table 7). Approximately 10% of these hunters did not hunt. In the case of the nonresident, approximately 12% did not hunt. The numbers of antelope harvested by residents and nonresidents from the several areas appears in Table 8. The mean number of days spent hunting by those hunters replying to the questionnaire is presented by area for both nonresidents and residents. The mean for the district was compiled from all questionnaires returned. It is interesting to note, that of all the permits issued, nonresidents received approximately 9% of them (district-wide). Nonresidents comprised 8% of the hunters in the field and accounted for 7% of the harvest. Sex and age classes of antelope harvested during the 1965 season is given in Table 9.

TABLE 6. 1965 Antelope hunting area quotas and applicants - District Three.

Area	Quota		Total Applications	Sample Rate %	Sample Size (No.)	Season Dates
	Tentative	Final				
30	600	600	1199	20	120	Sept. 5 - Nov. 14
31	350	350	584	20	70	Sept. 5 - Nov. 14
33	2500	2500	2684	20	500	Oct. 24 - Nov. 28
34	30	30	78	100	30	Oct. 17 - Nov. 14
36	250	250	378	20	50	Sept. 5 - Sept. 26
37	150	100	279	100	100	Oct. 17 - Nov. 14
38	100	50	230	100	50	Oct. 17 - Nov. 14
311	100	100	206	100	100	Oct. 17 - Nov. 14
320	100	50	139	100	150	Oct. 17 - Nov. 14
339	350	350	635	20	70	Oct. 17 - Nov. 14
340	150	150	200	100	150	Oct. 17 - Nov. 14
350	20	20	29	100	20	Oct. 17 - Nov. 14

TABLE 7. 1965 Antelope permit information, District Three, Postal Questionnaire.

	Permits Issued			Number of Hunters. Resident		Nonresident	
Area	Res.	NR	Total	Point	Range*	Point	Range*
30	557	44	601	518	472-540	44	5-44
31	317	35	352	302	267-313	28	13-34
33	2252	250	2502	1916	1814-1997	229	195-243
34	30	0	30	29	25-29	-	-
36	231	19	250	225	198-230	0	-
37	100	1	101	99	93-99	0	-
38	50	0	50	45	38-46	-	-
311	94	6	100	89	81-90	5	3-5
320	50	1	51	47	40-48	0	-
339	328	22	350	328	41-328	22	2-22
340	136	15	151	131	124-132	15	10-15
350	20	0	20	19	14-19	-	-
Total	4165	393	4558	3748	3744-3897	343	317-376

* 95% Confindence Limits

TABLE 8. 1965 Antelope harvest, District Three, Postal Questionnaire.

	Residents Harvest 1/				Nonresident Harvest1/				
Area	Point	Range	Hunter Success 2/	No. Days Spent Hunting	Point	Range	Hunter Success 2/	No. Days Spent Hunting	Ttl Harvest
30	364	299-410	70	2.1	35	17-40	80	2.4	399
31	264	220-290	87	2.1	14	4-20	50	2.5	278
33	1191	1063-1310	62	1.9	118	80-150	52	1.8	1309
34	23	20-27	79	2.2	0	-	-	-	23
36	199	165-210	88	2.4	0	-	-	-	199
37	77	67-80	78	2.5	0	-	-	-	77
38	32	24-37	71	2.9	0	-	-	-	32
311	72	61-78	81	2.1	5	3-5	100	1.0	77
320	37	28-40	79	1.7	0	-	-	-	37
339	272	225-300	83	2.0	22	2-22	100	1.5	294
340	96	83-100	73	2.4	8	5-10	53	2.6	104
350	8	6-10	42	2.7	0	-	-	-	8
Total	2635	2631-2890	70	2.2	202	158-250	59	2.0	2837

1/ Postal questionnaire. Range given is 95% confidence limits. Upper limit estimated for last digit.

2/ Based on point estimate of harvest and point estimate of hunters (see Table 7).

TABLE 9. Sex and age classes of 1965 District Three antelope harvest, postal questionnaire.

Area	Resident				Nonresident			
	M	F	Fwn	Uncl.	M	F	Fwn	Uncl.
30	224	100	38	2	26	0	8	1
31	143	75	45	1	7	7	0	0
33	542	557	83	9	55	55	6	2
34	14	8	0	1	-	-	-	-
36	96	83	19	1	-	-	-	-
37	42	27	6	2	-	-	-	-
38	21	10	0	1	-	-	-	-
311	40	31	0	1	3	0	1	1
320	17	16	3	1	-	-	-	-
339	128	144	0	0	11	11	0	0
340	47	41	6	2	1	6	0	1
350	3	3	0	2	-	-	-	-
Total	1317	1095	200	23	103	79	15	5
%	50	42	7	1	51	39	7	2

Checking stations were operated south of Dillon during portions of the 1965 antelope season. The information collected at these stations appears in Tables 10, 11 12 and 13. For the four days (Oct. 24, 25, 30 and 31 - Table 12) the Dillon station was operated, 378 hunters were checked. Ten of the hunters were nonresident and 14 were hunters who had hunted in areas other than Area 33. The Centennial Valley, the Blacktail and Sage Creek are all popular antelope hunting regions within antelope hunting Area 33.

TABLE 10. Antelope checking station information, Dillon, September 5, 1965.

		Area 30		Area 31		Total	
Hunters Checked		81		20		101	
Percent Successful		60		95		68	
Harvest:	Males	24	96M/100F	9	90M/100F	33	93M/100F
	Females	25		10		35	
	Adults	38	29F/100Ad.	14	35F/100Ad.	52	31F/100Ad.
	Males	9		8		27	
	Females	19		6		25	
	Fawns	11	56Fwn/100F	5	85Fwn/100F	16	64Fwn/100F

Year Class	M	F	M	F	M	F
1/2	5	6	1	4	6	10
1 1/2	5	1	0	1	5	2
2 1/2	5	2	2	0	7	2
3 1/2	2	0	0	0	2	0
4 1/2 - 6 1/2	6	7	4	0	10	7
7 1/2 +			NONE			

TABLE 11. Antelope weights, Dillon checking station, September 5, 1965.

Year	Area 30				Area 31				Total			
	M		F		M		F		M		F	
Class	Wt.[1]	Rge.	Wt.	Rge.	Wt.	Rge.	Wt.	Rge.	Wt.	Rge.	Wt.	Rge.
1/2	40(1) [2]	-	41.5(20)	40-41	-	-	-	-	-	-	-	-
1 1/2	78(5)	70-85	71(1)	-	-	-	-	-	-	-	-	-
2 1/2	88(4)	82-93	77(1)	-	103(2)	96-110	-	-	91.5(6)	82-110	-	-
3 1/2	90.5(2)	85-96	-	-	-	-	-	-	-	-	-	-
4 1/2 - 6 1/2	94(4)	87-100	78(7)	74-85	88(2)	85-91	-	-	92(6)	87-100	-	-

[1] Pounds, hog-dressed.

[2] Number of animals weighed.

TABLE 12. Antelope harvest, Dillon checking station, 1965.

Area	October 24 & 25	October 30 & 31	Total	Per 100	% of Kill
Centennial Valley					
M/F (Ads)	50/62	10/14	60/76	79/100	
Fwn/F	38/62	7/14	45/76	59/100	
Fwn/Ad	38/112	7/24	45/136	33/100	
Total Antelope	150	31	181		69%
Blacktail					
M/F (Ads)	9/11	10/5	19/16	119/100	
Fwn/F	9/11	5/5	14/16	88/100	
Fwn/Ads	9/20	5/15	14/35	40/100	
Total Antelope	29	20	49		19%
Sage Creek					
M/F (Ads)	7/12	3/8	10/20	50/100	
Fwn/F	3/12	0/8	3/20	15/100	
Fwn/Ads	3/19	0/11	3/30	10/100	
Total Antelope	22	11	33		12%
All Areas					
M/F (Ads)	66/85	23/27	89/112	73/100	
Fwn/F	50/85	12/27	62/112	55/100	
Fwn/Ads	50/151	12/50	62/201	31/100	
Total Antelope	201	62	263		
Total Hunters	246	118	364		
Hunter Success (%)	83	53	72		

TABLE 13. Age structure of 263 antelope checked at Dillon, October 1965.

	Age Class					
Location	1/2 yr.	1 1/2 yr.	2 1/2 yr.	3 1/2 yr.	4 1/2+ yr.	Unknown (Ad.)
Centennial	45	35	13	12	18	58
Blacktail	14	3	8	8	11	5
Sage Creek	3	8	2	2	6	12
Total	62	46	23	22	35	75
%	24	18	9	9	12	28

The postal questionnaire indicate a hunter success of 71% for the entire season as compared to 60% for the first day from the checking station in Area 30. In area 31 success for the entire season from postal questionnaire was 84% and from the checking station on opening day it was 95%. During the four days of checking hunters from Area 33 on the opening and the second weekend, hunter success was 72%. The postal questionnaire indicated hunter success for the entire season at 61%.

The 263 antelope checked during the four day operation of the station at Dillon in 1965 were classified as to age by tooth replacement and wear (Table 13). The apparent age structure using total known age antelope but excluding the unknown age adults indicate a desirable age structure.

Several antelope marked in Idaho have been recovered in Montana during the hunting season. An adult doe trapped and marked in Clark County on Crooked Creek approximately 5 miles west of Liddy Hot Springs, Idaho on January 19, 1962 was shot in Montana on September 5, 1965 about 15 miles west of Grant near the Idaho-Montana line. The recovery location is about 100 miles airline NNW of the tagging site.

On January 18, 1962, the Idaho Fish and Game trapped and marked a yearling fawn near Liddy Hot Springs. This animal was taken in Montana in Sheep Basin west of Lima on September 25, 1965. The recovery site is approximately 35 miles airline NNW of the marking site.

During the past 5-6 year a significant number of antelope marked in Idaho have been observed in Montana during aerial surveys and one or two are harvested in Montana each year.

The relationship between antelope and sagebrush is well documented. The significance of this relationship has taken on considerable importance in view of the current sagebrush control programs initiated by several federal agencies. Antelope have been observed from time to time in connection with certain other activities in areas of sagebrush. These observations, presented in Table 14, may be of value in assessing future sagebrush spray project proposals.

TABLE 14. Antelope observed in sagebrush.

Area and Date	No. Antelope Observed	Location
Area 30		
1/19/66	45	1 mile SW of Lima
Area 31		
3/14/66	44	Sec. 31, T6S-R13W (Grasshopper)
3/14/66	26	Sec. 11, T7S-R11W (Rattlesnake)
3/17/66	11	Near Ermont Mine
3/18/66	55	Sec. 31, T6S-R13W (Grasshopper)
4/1/66	35	Near Ermont Mine
Area 33		
4/8/66	290	Basin Creek

MOUNTAIN GOATS

For the 1965 Mountain Goat season, there were some 835 applications for the 175 mountain goat permits available in District Three. One hundred and seventy-nine nonresidents made application for those permits or about 21% of the total applications received. The highest number of nonresident applications (55%) were received for hunting area 323. Table 15 lists applications received from residents and nonresidents. The 1965 legislative assembly passed a law prohibiting the issuing of more than 10% of the special licenses for a given species available, to nonresidents. For example, of the 30 permits available in Mountain Goat Area 312, only 3 of the 51 nonresidents applying for those permits would be eligible to receive one.

Results of the 1965 Mountain Goat harvest in District Three as determined from postal questionnaires are presented in Tables 16 and 17.

A few Mountain Goats were observed during the report period. Three adults were observed April 25, 1966 in the NW 1/2 of Sec. 36 along Jack Creek in Area 324. On May 15, 1966 ten adults were observed in Canyon Creek across from the Lime Kilns in Area 312.

During the 1965 Mountain Goat season in Area 325, a mature female was shot near Echo Lake. This animal was trapped and marked at Trapper Creek north of Dillon. The animal was released April 15, 1959 in Wolf Creek in Madison County. The release site is about 10 miles north of the area where she was killed. On September 27, 1965 a mature female Mountain Goat was shot 1/2 mile west of Finger Mountain on the Wolf-Moose Creeks divide in Madison County. This goat was also trapped and marked at the Trapper Creek site north of Dillon. She was also released on April 15, 1959 on Wolf Creek. The kill site is about 3-5 miles east and south of the release point.

On August 31, 1965 personnel from the Forest Service and Fish and Game Department inspected the area around Hardscrabble Peak in the Bridger Mountains above Fairy Lake north of Bozeman in connection with a proposed Mountain Goat introduction. The Forest Service expressed interest in such an introduction as a method of enhancing the Fairy Lake campground which is currently being expanded and which may be further expanded in the future. The inspection trip indicated a small plant of Mountain Goats was feasible and desirable. The necessary agreements will be drawn up between the Fish and Game and Forest Service for an introduction of 6-8 Mountain Goats. No deadline was established for the introduction.

TABLE 15. 1965 Mountain Goat Permit Applications.

Area	Total Applications			
	Nonresident	Resident	Total	Quota
312	51 (26%)	143	194	30
313	56 (14%)	357	413	100
320	5 (9%)	53	58	10
322	9 (28%)	23	32	10
323	40 (55%)	33	73	10
324	2 (8%)	24	26	5
325	16 (41%)	23	39	10
Total	179 (21%)	656 (79%)	835	175

TABLE 16. Mountain Goat harvest data-postal questionnaire - 1961-1965.

Area	Year	No. Permits	Hunters Hunting	% Success	Harvest	Hampered by Weather (%)
312	1961	30	21	48	10	-
	1962	30	27	39	10	25
	1963	30	26	46	12	65
	1964	30	27	48	13	25
	1965	30	26	68	18	53
313	1961	100	69	35	24	-
	1962	100	74	47	35	36
	1963	100	79	48	38	48
	1964	100	84	44	37	43
	1965	100	75	21	16	75
320	New Area in 1965					
	1965	10	10	40	4	90
322	1961	New Area in 1962				
	1962	10	10	83	8	20
	1963	10	9	33	3	60
	1964	10	8	50	4	43
	1965	10	7	100	7	0

TABLE 16 - CONTINUED.

Area	Year	No. Permits	Hunters Hunting	% Success	Harvest	Hampered by Weather (%)
323	New Area in 1964					
	1964	10	9	67	6	62
	1965	10	9	57	4	78
324	New Area in 1964					
	1964	5	4	100	4	50
	1965	5	5	50	3	100
325	New Area in 1965					
	1965	10	10	57	6	29

TABLE 17. Sex of Mountain Goats harvest as determined by mail questionnaires.

Area	Male	Female	Unknown	Total
312	9	8	1	18
313	11	4	1	16
320	2	2	0	4
322	5	1	1	7
323	4	0	0	4
324	2	0	1	3
325	1	4	1	6

MOUNTAIN SHEEP

Since Mountain Sheep permits issued for District Three are valid in either Areas 301 or 501, dealers frequently put both area numbers on the permit. Therefore, no attempt was made in 1965 or prior years to record the number issued. In Helena the only record available for 1965 is that of the applicants that were issued permits during the course of the drawing. This information shows that for Area 301 there were 78 resident and 73 $100 nonresidents, and for area 501 there were 25 residents and 32 $100 nonresidents. (Area 501 is the same as the 1964 hunting area designated as 302)

Table 18 presents information for harvest and permits for Areas 301 and 501.

TABLE 18. Mountain Sheep harvest 1965 District Three.

Area	Permits Sold	No. Hunters	No. Killed	% Success	% Hampered by Weather
301	-	128	15	11.7	48.0
501	-	61	11	18.0	41.0
Total	242	189	26	13.8	-

Comparison of 1965 harvest data with previous years (for both Area 301 and 501) is shown in Table 19.

TABLE 19. Mountain Sheep harvest 1962-1965, Areas 301-501.

Year	Permits	No. Hunters	% Success	Harvest
1962	361	271	8.4	23
1963	518	400	9.0	36
1964	399	277	8.7	24
1965	242	189	13.8	26

Unofficial reports indicate that during the 1965 season there were some 15-16 rams taken out of the Spanish Peaks district of Sheep area 301.

MOOSE

The District Three moose harvest during the 1965 season as determined by postal questionnaire is presented in Table 20. Although the number of permits issued in 1965 and 1964 for the entire district was the same, there were two new areas added in 1965. (Table 21). The original recommendation for the Moose permit quota in District Three for the 1965 season was 510. This was reduced to 345 or a reduction of some 32%. A special study on Moose is being carried on under project W-98-R and much of the range and population work is reported under that project. Under that project it was determined by hunter contacts that at the end of the Moose season (October 3 - November 7, 1965 inclusive) in Area 310, twenty legal and 3 illegal kills were accounted for, with a hunter success of 33%. The postal questionnaire indicate 25 moose taken legally with a hunter success of 43%. Use of either harvest figure indicates an inadequate harvest. This may be due to an important part of this area being closed to all hunting during the Moose season. The Gallatin Game Closure by "agreement" is closed to all hunting during the elk season which coincides with the moose season. The season is also held early and perhaps hunters are not afforded the best opportunity to bag a moose in 310. Serious thought should be given to alterations in season dates, changes in regulations governing the closure or both if adequate moose harvests are to be effected in 310.

TABLE 20. Moose harvest information. 1965 - District Three.

							Harvest Sex-Age					
		Hunters		Percent	Harvest (No.)		Age Class			Sex Class		
Area	Permits	Point	Range	Success	Point	Range	Adult	Calves	Unknown	M	F	U
31	20	18	17-18	72	13	12-13	10	2	1	7	5	1
32	10	10	10-10	40	4	4-4	3	1	0	2	2	0
33	25	25	21-25	44	11	9-13	9	1	1	5	4	2
35	5	5	5-5	40	2	2-2	2	0	0	1	1	0
36	15	15	11-15	53	8	6-10	8	0	0	4	4	0
38	5	5	5-5	80	4	4-4	3	1	0	1	3	0
310	60	58	56-58	43	25	24-26	23	1	1	10	14	1
311	50	49	45-49	82	40	35-41	35	3	2	17	22	1
314	15	15	15-15	93	14	14-14	13	1	0	11	3	0
316	10	9	7-9	89	8	6-8	7	0	1	1	6	1
317	10	10	8-10	100	10	8-10	10	0	0	1	8	1
318	10	9	6-9	67	6	4-7	5	0	1	1	4	1
319	5	5	3-5	60	3	2-4	3	0	0	1	1	1
320	10	10	10-10	60	6	6-6	5	1	0	5	1	0
321	20	20	17-20	90	18	15-18	16	1	1	7	10	1
322	15	15	13-15	87	13	11-13	11	1	1	3	9	1
331	15	15	15-15	67	10	10-10	9	1	0	5	5	0
332	15	15	15-15	47	7	7-7	4	2	1	2	5	0
333	15	15	13-15	33	5	4-6	4	0	1	1	3	1
333.1	5	5	5-5	100	5	5-5	4	1	0	3	2	0
361	10	10	9-10	90	9	8-9	8	0	1	2	6	1
Total*	345	337	329-338	64	217	198-230	196	18	3			

* Based on total questionnaires.

TABLE 21. Moose harvest 1962-1965 - District Three.

Area	Permits				Harvest				Success			
	1962	1963	1964	1965	1962	1963	1964	1965	1962	1963	1964	1965
31	20	20	20	20	14	12	12	13	78	71	60	72
32	60	60	10	10	58	52	3	4	98	87	30	40
33 (was 33.1)	60	50	25	25	36	29	16	11	65	58	64	44
35	5	5	5	5	3	5	4	2	60	100	80	40
36	30	30	15	15	17	12	8	8	56	41	62	53
38 (new in 1965)	X	X	X	5	X	X	X	4	X	X	X	80
310	60	60	60	60	40	41	37	25	67	71	63	43
311	50	50	50	50	47	44	41	40	96	90	87	82
314	10	10	15	15	9	8	11	14	90	80	73	93
316 (was 316.1)	10	10	10	10	9	6	4	8	89	67	40	89
317 (was 316.2)	10	10	10	10	9	8	6	10	86	80	67	100
318 (was 316.3)	10	10	10	10	8	6	7	6	80	67	70	67
319	5	5	5	5	5	4	5	3	100	80	100	60
320	10	10	10	10	8	8	7	6	78	80	70	60
321	X	X	20	20	X	X	18	18	X	X	95	90
322 (was 316.4)	10	15	15	15	10	10	13	13	100	71	93	90
331 (was 33.2)	60	50	25	15	43	27	6	10	74	60	26	67
332 (was 33.3)	40	30	15	15	23	16	13	7	57	57	87	47
333 (was 33.4)	40	30	15	15	22	21	11	5	60	70	85	33
333.1	X	X	X	5	X	X	X	5	X	X	X	100
361 (was 310.1)	10	10	10	10	9	8	10	9	100	80	100	90
Total [1]	505[2]	465	345	345	270	316	232	217	75	71	70	64*

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[1] Not area totals - computations based on total questionnaire sample.

[2] In 1962 there was an Area 318 north of Butte. It is not shown in this table. (See Table 17. Page 19 W-73-R-9-10 Job A-1 Completion Report titled "Big Game Survey & Investigations - Antelope, Bighorn Sheep, Mountain Goat and Moose.)

X-No area.

* Based on hunters hunting.

Most aerial flights made under project W-73-R will appear in the W-98-R reports. However, for continuity in reporting the population surveys from the areas near Dillon aerial survey data obtained during the report period under W-73-R are given in Tables 22, 23 and 24. The flight data presented in Table 22 does not represent coverage of the entire Big Hole. The flight was confined mostly to the West side and probably amounts to only a 10-15% coverage of the Big Hole. The area of normally dense moose numbers just north of Wisdom was not covered. From Table 22, five males, 9 females and 8 calves were observed north of Highway 43. This amounts to a ratio of some 57 calves per 100 adults. South of Highway 43 there were 6 males, 14 females and 9 calves with a ratio of 45 calves per 100 adults. Possible twin calves were observed in Swamp Creek northwest of Jackson. The overall ratio was 50 calves per 100 adults. The ratio south of the Highway agrees closely with that found by Kirsch in 1964.

The February flight (Table 23) in Grasshopper Creek indicated a calf/adult ratio of 32/100.

TABLE 22. Moose observations, Big Hole, January 13, 1966.

Moose Observed				
Male	Female	Calf	Total	Location
	1	1	2	Fishtrap Creek
	1	1	2	Fishtrap Creek
2			2	West Fork Mudd Creek
2	2	2	6	McCormick Creek
	3	3	6	North Fork Big Hole
	1	1	2	North Fork Big Hole
	1		1	North Fork Big Hole
1			1	North Fork Big Hole
	1		1	Swamp Creek (Just S. Hwy #43)
	1		1	Swamp Creek (Just S. Hwy #43)
3			3	Big Lake Creek
	1	2	3	Swamp Creek (West of Jackson)
	1	1	2	Little Lake Creek
2			2	Little Lake Creek
	1	1	2	Little Lake Creek
	1	1	2	Little Lake Creek
	1	1	2	Gravelle Creek
	1	1	2	Miner Creek
	1		1	Southwest of Jackson
1	2	1	4	Southwest of Jackson
	1		1	Big Hole
	1	1	2	Big Hole
	1		1	Big Hole
Total				
11	23	17	51	

TABLE 23. Moose observations - Grasshopper, February 15, 1966.

Moose Observed			
Adults	Calves	Total	Location
1		1	Grasshopper Creek SE 1/4 Sec. 26 7S-12W
1		1	Buffalo Creek SE 1/4 Sec. 29 7S-12W
1	1	2	Buffalo Creek NE 1/4 Sec. 31 7S-12W
1		1	Buffalo Creek NE 1/4 Sec. 31 7S-12W
1	1	2	Brays Canyon NE 1/4 Sec. 36 7S-13W
2		2	Buffalo Creek SE 1/4 Sec. 36 7S-13W
1	1	2	Buffalo Creek NW 1/4 Sec. 1 8S-13W
1	1	2	Buffalo Creek SW 1/4 Sec. 1 8S-13W
1	1	2	Buffalo Creek NW 1/4 Sec. 10 8S-13W
2		2	Buffalo Creek NE 1/4 Sec. 9 8S-13W
1	1	2	Hayes Creek NE 1/4 Sec. 24 7S-13W
2	1	3	Hayes Creek SE 1/4 Sec. 18 7S-12W
1		1	Hayes Creek NE 1/4 Sec. 19 7S-12W
1		1	Swamp Creek SW 1/4 Sec. 7 7S-12W
1		1	Between Middle and Wakefield Creeks S 1/2 Sec. 23 6S-13W
2*		2	Middle Creek NE 1/4 Sec. 22 6S-13W

TABLE 23 - CONTINUED.

Moose Observed			
Adults	Calves	Total	Location
Sub Total		27	South of Highway 278
2		2	Above Circle S. Buildings E 1/2 Sec. 4 6S-13W
1*		1	Pole Creek NE 1/4 Sec. 2 6S-13W
2		2	Snyder Creek NW 1/4 Sec. 13 5S-13W
1	1	2	Snyder Creek SW 1/4 Sec. 18 5S-13W
1	1	2	Grasshopper Creek S 1/2 Sec. 8 5S-12W
1		1	Shale Creek NW 1/4 Sec. 8 5S-12W
Subtotal		10	North of Highway 278
Grand Total			
28	9	37	Grasshopper Drainage

* Includes one male.

This compares to a calf/adult ratio of 30/100reported by Kirsch in 1964. The March flight (Table 24) in the Big Hole shows an indicated ratio of 50 calves/100 adults. During the March flight 1 adult and 1 calf moose were also observed in Pole Creek in the Grasshopper drainage.

TABLE 24. Moose observations - Big Hole, March 4, 1966.

Moose Observed			
Adult	Calf	Total	Location
1	1	2	Sheep Creek
1		1	McVay Creek
2	1	3	Steel Creek
1	1	2	Doolittle Creek
2		2	Squaw Creek
1	1	2	Squaw Creek
8	4	12	Total

BEAR

The bear harvest for 1963-1965 is presented in Table 25.

TABLE 25. Bear Harvest, 1963-1965, District Three.

		Hunters		Harvest		Percent	Species		
Area	Year	Point	Range	Point	Range	Success	Black	Grizzly	Unknown
30	1963	366	233-508	0	-	-	-	-	-
	1964	26	10-42	1	0-4	6	1	0	0
	1965	9	0-29	0	-	0	-	-	-
31	1963	992	758-1226	0	-	-	-	-	-
	1964	158	119-197	6	0-12	4	6	0	0
	1965	99	31-167	0	-	-	-	-	-
32	1963	903	680-1127	0	-	-	-	-	-
	1964	175	134-216	28	15-41	16	26	0	2
	1965	92	26-158	0	-	-	-	-	-
33	1963	1728	1420-2037	17	0-45	1	17	0	0
	1964	225	179-272	20	9-31	9	18	2	0
	1965	305	186-424	35	0-72	12	27	-	9
34	1963	175	76-274	0	-	-	-	-	-
	1964	46	25-67	4	0-9	8	4	-	-
	1965	72	--72	0	-	-	-	-	-
35	1963	319	186-452	0	-	-	-	-	-
	1964	90	61-120	6	0-12	6	4	2	0
	1965	82	20-145	0	-	-	-	-	-
36	1963	484	320-648	0	-	-	-	-	-
	1964	58	35-82	5	0-11	9	5	0	0
	1965	95	28-162	24	0-51	25	24	0	0
37	1963	121	39-204	0	-	-	-	-	-
	1964	15	3-27	0	-	-	-	-	-
	1965	0	-	-	-	-	-	-	-
38	1963	353	213-493	15	0-43	4	15	0	0
	1964	56	33-79	5	0-11	10	5	0	0
	1965	80	19-141	12	0-33	15	12	0	0
39	1963	585	405-765	0	-	-	-	-	-
	1964	63	38-87	5	0-11	10	5	0	0
	1965	62	8-116	12	0-31	19	12	0	0
310	1963	840	625-1056	8	0-27	1	8	0	0
	1964	134	98-169	16	6-25	12	16	0	0
	1965	108	37-179	0	-	-	-	-	-
311	1963	1396	1118-1673	69	10-128	5	69	0	0
	1964	309	255-364	44	27-60	14	38	6	0
	1965	200	103-296	0	-	-	-	-	-
312*	1963	1196	939-1453	23	0-59	2	23	0	0
	1964	113	80-146	4	0-10	3	2	2	0
	1965	83	21-145	18	0-40	21	18	0	0

TABLE 25 - CONTINUED.

		Hunters		Harvest		Percent	Species		
Area	Year	Point	Range	Point	Range	Success	Black	Grizzly	Unknown
313	1963	186	84-288	0	-	-	-	-	-
	1964	65	40-90	11	3-19	17	9	2	0
	1965	62	8-117	9	0-26	14	9	0	0
314	1963	437	281-593	0	-	-	-	-	-
	1964	108	76-141	19	9-30	18	19	0	0
	1965	164	76-252	12	0-33	7	12	0	0
315	1963	274	151-398	15	0-43	6	15	0	0
	1964	25	10-41	8	1-14	31	6	2	0
	1965	12	--36	0	-	-	-	-	-
316	1963	206	99-313	15	0-39	7	15	0	0
	1964	132	97-168	14	5-23	11	13	1	0
	1965	105	35-175	12	0-33	11	12	0	0
317	1963	389	242-536	15	0-44	4	15	0	0
	1964	87	58-116	6	0-12	7	6	0	0
	1965	68	12-125	0	-	-	-	-	-
318	1963	374	230-518	0	-	-	-	-	-
	1964	45	24-66	3	0-7	7	3	0	0
	1965	42	--86	0	-	-	-	-	-
319	1963	243	127-359	0	-	-	-	-	-
	1964	41	21-61	4	0-9	9	4	0	0
	1965	50	2-99	0	-	-	-	-	-
320	1963	459	300-619	15	0-43	3	15	0	0
	1964	113	80-145	9	1-17	8	8	1	0
	1965	98	30-166	9	0-26	9	9	0	0
361	1963	192	88-295	0	-	-	-	-	-
	1964	33	15-50	1	0-4	5	1	0	0
	1965	12	--35	0	-	-	-	-	-
District									
	1963	12218	11433-13003	193	95-291	2	193	0	0
	1964	2119	1978-2260	219	182-257	10	198	20	2
	1965	1852	1560-2145	69	69-216	8	133	0	9

*Includes 312.1 - no harvest indicated in 312.1

Submitted by: Joseph L. Egan Approved by: Wynn G. Freeman

Date September 30, 1967

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Job No.: A-1

Period Covered: July 1, 1962 through June 30, 1967

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The Mountain Mahogany Range in Scudder Creek
1953 to June, 1967

Abstract:

Scudder Creek, about thirty miles west of Dillon in the Grasshopper Creek drainage, is typical of most southwestern Montana deer ranges. Deer numbers reached a peak in the early 1950's, and since have declined as the quantity and quality of deer winter range has deteriorated. A brief summary of a food habits study by South (1957) is included. Range data for the period 1957-67 is listed, indicating a definite downward trend in range conditions. Estimated hunter harvests and fawn production, as related to range conditions, are discussed. It was concluded that the relatively liberal seasons of the past and present have not reduced the deer population to a level allowing range recovery. The Appendix contains data gathered in 1964-66, as the beginning of a long-term study to determine the influence of protection from browsing on the condition, mortality, utilization and rate of re-establishment of mountain mahogany plants inside and outside the exclosures at Scudder Creek. Similar data should be gathered every five years.

Introduction:

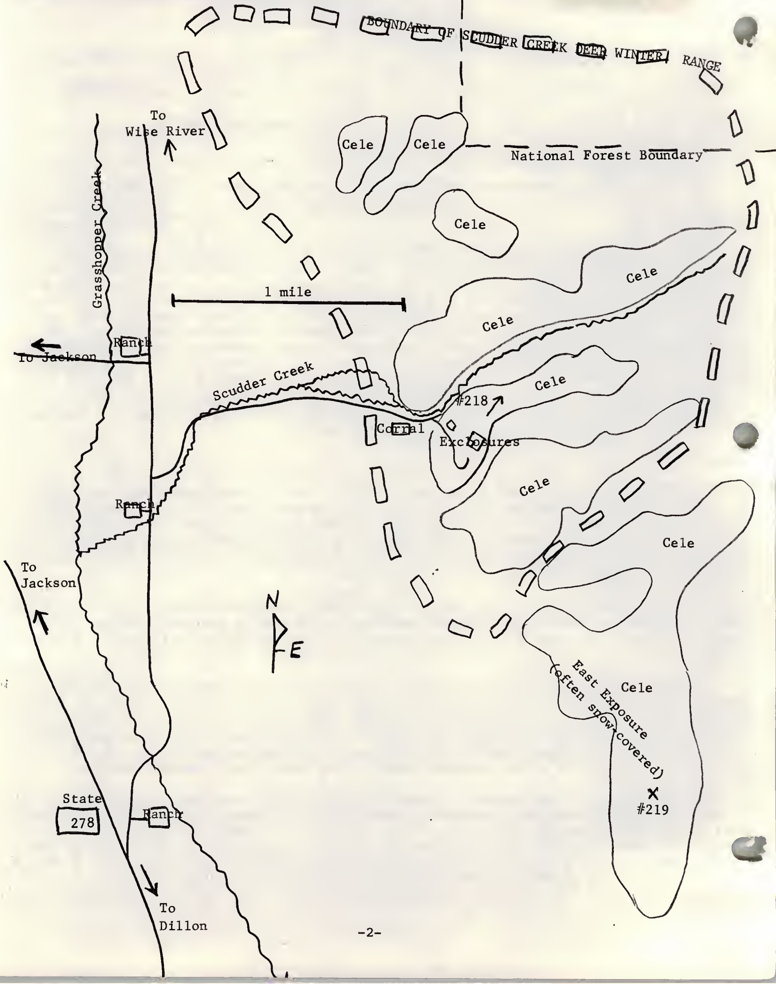
Scudder Creek, about thirty miles west of Dillon in the Grasshopper Creek drainage, is typical of most southwestern Montana winter deer ranges (Figure 1). Snow forces deer out of the higher country to a relatively small wintering area of south and west exposure and less snow. The key winter food plant here is mountain mahogany (Cercocarpus ledifolius), and the size and welfare of the deer herd is directly dependent upon the quality and quantity of mountain mahogany available to deer during winter.

History of this deer herd is typical of most Montana deer herds east of the Continental Divide - increasing beyond range capacity and reaching a peak in the early 1950's. Since then, condition of the deer winter range has deteriorated, resulting in a decline in deer numbers.

Prior to 1950, hunting was for bucks only. In the early 1950's, buck only with a few days of either sex on the end were characteristic. The first full length either sex season was in 1955, and from 1956-67 two deer either sex seasons were employed (except 1959-one deer). Several years an unlimited number of $20 nonresident permits were available, and a few late special hunts were conducted. In spite of these past seasons, which were as liberal as those anywhere in the state, the deer herd is still above range-carrying capacity.

Montana Fish and Game Department personnel have gathered detailed information from the Scudder Creek deer winter range and others since the early 1950's. In addition to routine work, an intensive study of this deer herd was conducted by South (1957) from 1953-57. That the present problem is one of long standing is evident when reading the old reports: 1950 - "Both mountain mahogany and juniper are browsed as high as a deer can reach"; 1951 - "Use of mountain mahogany is excessive. The deer are in poor condition - heavy losses can be expected this spring"; 1954 - "The browse on Scudder Creek is largely dead or dying mountain mahogany shrubs."

FIGURE 1. SCUDDER CREEK DEER WINTER RANGE.



At this point, it would be worthwhile to review some of the findings of South (1957).

South's Study, 1953-57

Range Use

Table 1 is a seasonal listing by vegetation type of the deer observed during the study. During winter, over 90% of the observations were made in the mountain mahogany-juniper type, an indication of the importance of this type as winter deer range in this vicinity. During spring, nearly one-half of the deer observed were in the lower elevation sagebrush-grassland type, while 30% were seen in the mountain mahogany-juniper type. In summer and fall, distribution was more general, with most deer found at the higher elevations. No deer were observed in the mountain mahogany-juniper type during summer, while 32% of fall observations were made there. The upper elevation sagebrush-grassland and the willow-aspen types were important to deer during summer and fall.

Food Habits

Food habits, determined by feeding site examinations and rumen analyses, are summarized in Table 2. Mountain mahogany accounted for 54, 40, and 21% of the volume of rumens during fall, winter, and spring, respectively. Rubber rabbitbrush (*Chrysothamnus nauseosus*) and three-tip sage (*Artemisia tripartita*) were other browse plants of importance during winter. Browse was the most important forage class during all seasons except summer, when forbs were most important. Dandelion (*Taraxacum officinale*) was the most used forb during summer. Grass was an important item only during a short period in spring.

A decline in use of mountain mahogany, fall through early spring, with a corresponding increase in use of unpalatable plants including other browses, forbs, and dry grass, was an indication of range depletion caused by too many deer for the available winter range. The poor physical condition of the deer collected during winter and spring supports the fact that range depletion had occurred.

Range Trend

Measurements of tagged mountain mahogany plants along a transect indicated that 100% of the annual growth was removed in each of the three years measured. There was also a decrease of 19% in total inches of twigs produced on these same plants during the same three year period. Use of other less palatable browse plants was also excessive - horse brush 99%, rubber rabbitbrush 88%, three-tip sage 83%, and Rocky Mountain juniper 65%. Networks of trails throughout the slopes caused erosion in the loose rocky soil, first noticed in 1956. On some of the more level areas, grass appeared to be replacing dead browse plants.

Conclusions

1. There was evidence that an overpopulated and depleted winter range led to the exhaustion of mountain mahogany before spring.

2. Range trend was downward as evidenced by excessive use of mountain mahogany, soil erosion, changes in vegetation, parasitism, disease and starvation.

Table 1. Use of vegetative types at different seasons as determined by ground observations of 968 deer and observations of 241 deer during three aerial surveys.

	Observations of deer							
	Winter		Spring		Summer		Fall	
Vegetational Type	%	No.	%	No.	%	No.	%	No.
Mountain mahogany - Rocky Mountain juniper	90.5	257	30.5	201	-	-	32.4	55
Willow - quaking aspen	0.3	1	3.3	22	36.5	35	17.6	30
Douglas fir	2.1	6	3.5	23	14.6	14	1.2	2
Lodgepole pine	-	-	-	-	11.4	11	6.5	11
Whitebark pine - alpine fir	-	-	-	-	5.2	5	0.6	1
Lower elevation sagebrush - grassland	5.3	15	46.1	304	3.1	3	5.3	9
Intermediate elevation sagebrush - grassland	1.8	5	16.6	109	10.4	10	9.4	16
Upper elevation sagebrush - grassland	-	-	-	-	18.8	18	27.0	46

Table 2. Browse preference and food habits as computed from 913 instances of plant use and 24 rumen samples.

(T=trace - less than 0.5 percent)

	Winter				Spring		Summer		Fall	
	Obs. Instances of Use		Ten Rumen Samples		Six Rumen Samples		Five Rumen Samples		Three Rumen Samples	
Plants	%	No.	% Vol.	% Wt.	% Vol.	% Wt.	% Vol.	% Wt.	% Vol.	% Wt.
Cercocarpus ledifolius	48.1	439	40.0	42.3	21.5	24.0	T	T	54.5	55.0
Pseudotsuga taxifolia	0.1	1	4.5	5.1	7.5	9.5			12.5	12.5
Chrysothamnus nauseosus	15.7	143	10.2	9.3	2.0	2.5			0.5	0.5
Artemisia tripartita	9.0	82	10.0	8.3	5.5	5.0				
Artemisia tridentata	3.9	35	2.3	2.0	4.0	3.5	0.5	1.0	5.5	4.0
Juniperus scopulorum	3.9	35	6.5	7.0	4.0	4.0			T	T
Tetradymia canescens	12.8	117	1.1	1.0	4.5	3.5			0.5	1.5
Rosa spp.	0.3	3	0.5	0.8			9.3	10.0		
Arctostaphylos uva-ursi	0.1	1	2.7	2.8	4.5	4.5	T	T		
Juniperus communis			0.3	0.3	6.0	6.5				
Salix spp.			1.5	1.7			4.0	4.5		
Betula occidentalis			4.0	4.3			T	T		
Populus tremuloides			1.0	1.3			2.5	2.5		
Chrysothamnus vicidiflorus	4.0	37	1.4	1.5	T	T				
Prunus virginiana							2.5	4.3		
Shepherdia canadensis			T	T	1.0	1.0	1.3	1.3	T	T
Pinus flexilis	0.3	3	1.4	1.5	0.5	0.5	T	T		
Vaccinium scoparium							1.5	2.0		
Potentilla fruticosa			1.4	1.1						
Ribes spp.	0.2	2	1.0	1.3			T	T		
Symphoricarpus alba			T	T						
Browse totals	98.4	898	89.8	91.6	61.0	64.5	21.6	25.6	73.0	73.0

Table 2 (Continued).

	Winter				Spring		Summer		Fall	
	Obs. Instances of Use		Ten Rumen Samples		Six Rumen Samples		Five Rumen Samples		Three Rumen Samples	
Plants	%	No.	% Vol.	% Wt.	% Vol.	% Wt.	% Vol.	% Wt.	% Vol.	% Wt.
Lupinus spp.	0.1	1					2.3	2.0	21.0	20.5
Taraxacum ceratophorum					1.5	1.0	22.5	19.8		
Haplopappus acaulis	0.4	4	2.3	1.5	8.5	8.5				
Phlox bryoides			2.5	2.0	8.0	7.0				
Helianthella uniflora	0.1	1					8.5	8.8		
Geranium viscossissimum							7.5	6.0		
Senecio crassulus							5.5	5.3		
Cymopterus bipinnata			T	T	5.0	4.0				
Frazera albicaulis					6.5	0.5	4.3	3.5		
Aster spp.							4.3	4.5		
Potentilla spp.							4.0	4.3	T	T
Cordylanthus ramosus			3.8	3.3	T	T				
Penstamen procerus							3.3	3.3		
Epilobium spp.							2.5	2.6		
Frageria virginiana							1.8	2.3		
Astragalus vexilliflexis							2.0	2.0		
Erigeron spp.							1.5	2.0		
Agoseris spp.					0.5	0.5	1.3	0.8		
Trifolium longipes							1.0	1.3		
Trifolium spp.							0.8	1.0		
Arnica cordifolia							1.0	0.5		
Achillea lanulosa							0.5	0.8	T	T
Balsamorrhiza sagittata							0.5	0.5		
Artemisia frigida			0.3	0.3	T	T				
Cirsium arvense			0.3	0.3	T	T				

Table 2 (Continued).

	Winter				Spring		Summer		Fall	
	Obs. Instances of Use		Ten Rumen Samples		Six Rumen Samples		Five Rumen Samples		Three Rumen Samples	
Plants	%	No.	% Vol.	% Wt.	% Vol.	% Wt.	% Vol.	% Wt.	% Vol.	% Wt.
Potentilla diversifolia							0.3	0.3		
Lesquerella alpina			T	T	T	T				
Zygodemus venosus			T	T	T	T				
Arenaria nuttallii					T	T				
Douglasia montana					T	T				
Draba ologsperma					T	T				
Eriogonum ovalifolium					T	T				
Eriogonum umbellatum							T	T		
Ligisticum spp.					T	T				
Pedicularis contorta							T	T		
Sedum stenopatalum					T	T				
Urtica dioica							T	T		
Unidentified forbs	1.0	9			1.0	0.5	T	T		
Forb totals	1.6	15	9.2	7.4	27.0	24.0	75.4	71.6	21.0	20.5
Gramineae			T	T	11.0	10.5	2.0	1.8	5.5	4.0
Lichen			T	T					T	T

A statement from South (1957) sums up what the situation was at the termination of his study in 1957: "Starvation losses before and during the study coupled with greatly expanded hunting seasons which began with 100 special either sex permits in addition to the regular 31 day buck season in 1952 and culminated in a two deer either sex season of 12 weeks' duration in 1956, has apparently failed, at the termination of this study, to reduce the herd to numbers compatible with the available forage."

That the Scudder Creek deer winter range continued to deteriorate during the years following 1957 was noticed by South (1966) during a visit to the area in the spring of 1963. He said, "The area had deteriorated noticeably since the years of his study." He also noticed that "nearly all of the tagged plants he was using during his study were all dead."

Current Findings:

Range

Table 3 is a summary of data gathered at Transect 218, 1957-67. A close look at this table discloses the fact that the Scudder Creek winter range is in poorer condition now than it was in 1957 - evidentally these ranges are never so poor that they can't get poorer! All categories of rating - leader use, dead crown, number of decadent plants, and number of plants in form class 3 and 6 - have increased the past five years as compared to the previous five.

Table 3. Condition and utilization of mountain mahogany at browse Transect #218, Scudder Creek (1957-1967).

Date	No. of Plants	Form Class %			Age Class %				Ave. % of Crown Dead	Leader Use %
		1 & 4	2 & 5	3 & 6	S	Y	M	D		
1957	30	7	13	80		17	7	76		76
1958	50	4	10	86		44	28	28		47
1959	50	2	10	88		6	8	86		85
1960	50		2	98		4	30	66	37	83
1961	50			100		4	2	94	54	88
1962	50			100			2	98	63	90
1963	50			100			2	98		90
1964 1/										
1965 2/	53 short	9	8	83	4	42	11	43	37	81
	47 tall			100			2	98	54	90
	100 total	5	4	91	2	22	6	70	45	85
1966 3/	48 short		4	96		29	4	67	35	65
	52 tall			100			2	98	53	90
	100 total		2	98		14	3	83	44	87
1967 4/	40 short		5	95		7	35	58	35	88
	49 tall		4	96			10	90	51	90
	89 total		4	96		4	21	75	44	89

1/ Transect not read. Transect converted to 100 tagged plants in August, 1964.
2/ The distinction between tall and short was at about 18".
3/ Of the original 53 short, tagged plants, 4 were dead and one could not be found.
4/ Of the original 53 short, tagged plants, 10 were dead and 3 could not be found. One tall plant (#46) could not be found.

In August, 1964, the transect was changed from a "closest plant" type to a "tagged plant" type with the tagging of 100 plants. Working with the same individual plants each year will more accurately reveal what is happening to the Scudder Creek deer winter range.

Of the original 100 plants tagged, 47 were mature tall plants, all over 18" in height. Many of the other 53 (less than 18") were also mature, while some were young, small plants, many of which were growing under taller plants. Because this system of tagging has built-in bias, the "tall" category offers a more reliable measure of range conditions than do the "short" or "overall" categories. A more detailed description of the relationship between these tall and short plants appears in the Appendix.

At the present time, mountain mahogany browse production on the Scudder Creek deer winter range is only a fraction of the potential. Deterioration, caused by past and present overutilization, has resulted in many dead and dying plants with poor vigor in those plants still relatively healthy. That this production of mountain mahogany furnishes but a negligible amount of the winter forage requirements of the deer herd is evidenced by the rate of utilization during early winter when the deer first appear on the winter range (Table 4). During the winters of 1963-64 and 64-65, utilization in excess of 90% occurred in the relatively short period of two or three weeks in December. In 1965-66, utilization had progressed to 56% by January 17, in spite of the relatively mild winter and general deer distribution. Mountain mahogany is apparently of very little value to deer wintering on Scudder Creek at the present time.

Table 4. Progressive utilization of mountain mahogany plants on the Scudder Creek deer winter range, winters of 1963-64, 64-65, and 65-66.

Date	No. Plants	Snow Depth	Leader Use	Remarks
12-5-63		0	0	Sheep tracks numerous - little deer sign. High sheep usage.
12-27-63		4 - 6"	95	
1-6-64		3 - 4"	99	
11-27-64	58	6"	3	Few deer tracks.
12-14-64	58	8 -10"	90	Deer tracks numerous - no sheep sign.
12-3-65	50	1 - 2"	1	Few deer tracks.
12-17-65	50	1 - 2"	5	
12-31-65	50	2 - 3"	40	
1-17-66	50	4 - 6"	56	Deer sign numerous.

Good leader growth was observed on Scudder Creek during 1963. On June 26, 1964, before current leader growth, 56 leaders were clipped at the terminal bud scar from the unavailable portion of plants outside the exclosures. Diameter of the leaders varied between 1/16 and 1/8 inch. The average leader length was 2.7 inches and averaged 0.536 grams in weight. During South's study, based on rumen analyses, it was determined that the average deer ate 2.2 pounds of air dry mountain mahogany per day in winter. Based on average 1963 leader growth, 1,867 leaders would be required to make a daily deer ration.

The past role played by domestic sheep in the present deteriorated condition of mountain mahogany plants on Scudder Creek is rather hazy. Past and recent reports show that sheep use was not uncommon and was probably severe some years. While it would be easy to pass the buck and blame domestic sheep for the present conditions on Scudder Creek, a realistic look at data collected from Scudder Creek and most other southwestern Montana deer ranges reveals that it was, and still is, primarily a deer problem resulting from "too many deer for the available forage." A resolution passed by the Dillon District Bureau of Land Management Advisory Board on January 5, 1966, should help eliminate any future competition and complications caused by domestic sheep on Scudder Creek:

RESOLUTION

> WHEREAS, there is approximately 700 acres in the Scudder Creek area that is classified as critical deer winter range and,
> WHEREAS, the key deer browse plant in this area is Mountain Mahogany and is in poor condition due to past overuse by both deer and livestock and,
> WHEREAS, this Board is interested in conservation, proper management and protection of all the natural resources and,
> WHEREAS, we have recommended, and the livestock user has agreed, that livestock use of the Mountain Mahogany in this area will be eliminated.
> NOW, THEREFORE, the District Advisory Board of Montana Grazing District No. 5, Bureau of Land Management, respectfully urges and recommends that the Montana Fish and Game Commission exert all possible effort to provide the maximum long term hunting opportunity for all sportsmen. If this requires post-season hunts, we endorse such seasons in the Scudder Creek area, or any other area where the regular season has been inadequate to harvest the proper number of game animals.

In 1953, a small exclosure (22 x 22) was erected at Scudder Creek to determine what effect, if any, complete protection would have on the condition of overused mountain mahogany plants. In December, 1963, an area about four times the size of the original was added to the existing exclosure. After several years of protection, a significant improvement in condition is noticeable. A more detailed study of the different aspects of this exclosure is discussed in the Appendix.

The past few years, mountain mahogany at Scudder Creek has received a fair amount of use by elk, adding to the problem. If this continues or increases, steps will have to be taken to minimize deer-elk competition.

Populations and Harvests

Table 5 is a summary of Area 31 deer harvests since 1957. The present Area 31 boundary was established before the 1960 hunting season; between 1957-59, the area north of Cherry Creek was not in Area 31. Since 1960, harvests have ranged from a low of 1,078 in 1965 to a high of 2,071 in 1963. That weather plays a major role in the magnitude of the harvest is suggested by the relatively low harvest in 1965 (1,078) during a mild fall, and a high harvest the next year (2,005) during a fall of more favorable hunting conditions. Although Area 31 includes a large portion of southwestern Montana, the upper Grasshopper Creek drainage is a popular place to hunt, and the Scudder Creek herd undoubtedly contributes significantly to the totals listed in Table 5. While there is still a fair-sized deer herd in the Scudder Creek vicinity, there is little doubt that there are fewer deer now than 15 years ago or that the population trend is down. It is interesting to note that the 1966 harvest was higher than either 1960 or 1961, when an unlimited number of $20 nonresident permits were available.

Table 5. Estimated deer harvests, Area 31.

Year	Estimated Harvests	Hunter Success
1957 1/	1,457	
1958	1,041 4/	
1959 2/	594	
1960 3/	1,746 4/	84
1961	1,892 4/	93
1962	1,941	89
1963	2,071	87
1964	1,694	79
1965	1,078	66
1966	2,005	85

1/ Regular season was extended.
2/ One deer season - all other years two deer.
3/ Present Area 31 boundary established.
4/ Indicates years when an unlimited number of $20 nonresident permits were available.

Table 6 is a summary of the deer checked at the Dillon check station the falls of 1965 and 1966 from the upper Grasshopper.

Table 6. Deer checked through Dillon check station 1965 and 1966 killed in upper Grasshopper.

	Deer Checked						No.
Date	½	1½	Mat.	Ad.	Unc.	Total	Hunters
Oct. 24, 25, 1965	3	4	1	1		9	
Oct. 30, 31, 1965	1	3	3	9		16	
Oct. 23, 1966					14	14	24
Oct. 30, 1966					12	12	24

Fawn production has been found by some investigators to be a reliable indicator of range conditions - high production on good range and poor production on poor range. Fawn production on Scudder Creek in the mid-1950's was about 100 fawns for every 100 does (South, 1966). Below the potential, but a good average. Average fawn production for the five years of data listed in Table 7 is 51 fawns per 100 adults - significantly lower than the average ten years ago. This is a subtle, but important, loss to the hunter, and is one of the results of a deteriorating winter range.

Table 7. Deer classifications on Scudder Creek.

Date	Fawn	Male	Female	Adult	Total	Fawns/100 Adults
1960	30			112	142	27
Dec., 1961	46	18	56		120	62
Apr., 1962	40			71	111	56
1963	91			186	277	49
Mar., 1967	61			104	165	59

Conclusions:

After over ten years of intensive management and liberal hunting seasons, the Scudder Creek deer winter range continues to deteriorate, and the deer herd remains above range-carrying capacity. Liberal seasons of the past and present have not accomplished past expectations.

One of the problems is the apparent lack of concern by the average sportsman for our dwindling deer resource. Only after it has reached an extremely low level will they awaken and demand to know what happened. "Show-me" trips are one way we have to keep the sporting public informed of the problems and the management programs designed to remedy these problems. While one such trip to Scudder Creek in May, 1965, had fair attendance, not even one sportsman attended a well-publicized meeting held in May, 1967!

A major ingredient of successful deer management is an intensive and continuing selling program. The public must be motivated to understand and demand a sound deer management program, and they must maintain this interest over a long period of time.

Literature Cited

South, Phillip R. 1957. Food habits and range use of the mule deer in the Scudder Creek area, Beaverhead County. M. S. Thesis. Montana State College, Bozeman.

South, Phillip R. 1966. Personal communication.

Submitted by: Eugene O. Allen

Approved by: Joseph L. Egan

Date: February, 1968

Wynn G. Freeman

APPENDIX

In June, 1964, a detailed study was initiated to determine the influence of protection from browsing on the condition, mortality, utilization, and rate of re-establishment of mountain mahogany plants inside and outside the exclosures at Scudder Creek (Figure 2). A portion of the study was repeated in the summers of 1965 and 1966.

Two general groups of plants were recognized: overstory and understory, with 18" in height being arbitrarily chosen as the category separation point. The understory class was further separated into two categories: understory open - plants less than 18" tall growing in open, and understory under canopy - small plants growing under the canopy of an overstory plant. Areas studied were inside and immediately outside the two exclosures and along Transect No. 218.

Appendix Table 1 compares condition and utilization of plants inside and immediately outside the exclosure for three different years. The shorter plants are somewhat protected from browsing by the taller plants and snow cover; condition is generally better and utilization less the more unavailable the plant is. It is interesting to note that after many years of protection, some plants inside the 1953 exclosure are still decadent and form class 3. Recovery is obviously a long-term process.

Appendix Table 2 compares the two exclosures from the standpoint of mountain mahogany population structure. There does not appear to be a lack of reproduction or initial plant establishment as evidenced by data in Appendix Table 2; 90% of the plants in the 1963 exclosure are understory with 76% growing under the protection of taller plants. Appendix Table 1 indicates 25% of the overstory plants outside the exclosures were producing seed which should be sufficient to keep the area restocked. It is significant that density of mountain mahogany plants inside the 1953 exclosure is nearly twice the density inside the 1963 structure. Mortality of young plants is great, and few live to the "mature overstory" category. While a combination of factors undoubtedly contribute to this mortality, overbrowsing by deer is a significant one.

Appendix Table 3 is a detailed description of Transect No. 218 as it appeared August 20, 1964, when 100 plants were tagged. It is interesting to note that by May, 1967, 10 of the original 100 plants were already dead - all understory plants. Another indication of high mortality in the understory category.

Appendix Table 4 is a detailed description of the mountain mahogany plants inside the 1953 exclosure. A total of 93 plants were found, of which 18 were overstory and 75 were understory. Of the 75 understory plants, 40 (53%) were growing in the open and 35 were growing under the canopy of an overstory plant.

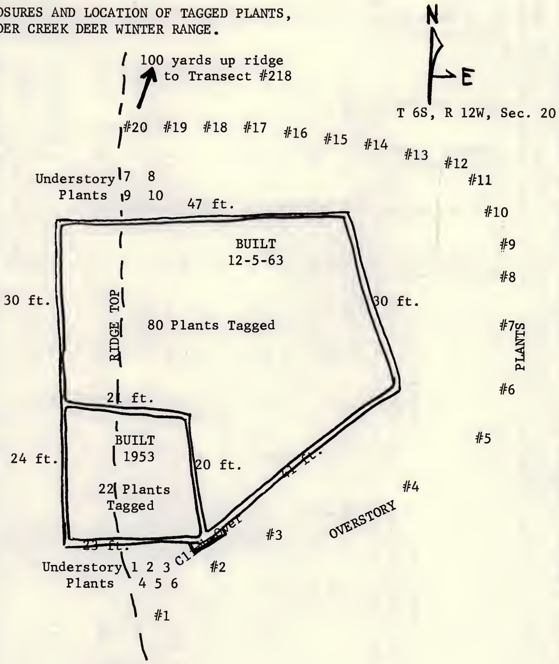
Appendix Table 5 is a detailed description of the mountain mahogany plants found inside the 1963 exclosure. A total of 203 plants were found, of which 20 were overstory and 183 were understory. Of the 20 overstory plants, 5 were dead. Of the 183 understory plants, only 29 (16%) were growing in the open - a marked contrast to the 53% found in the open inside the 1953 exclosure. An average of 8 live plants were found under each of the 15 living overstory plants, and an average of 7 were found under each of the 5 dead ones.

Appendix Table 6 is a detailed description of 20 overstory and associated understory plants in the immediate vicinity outside the exclosures. A total of 155 understory plants were found growing under the 20 overstory plants, for an 8 average - the same as inside the 1963 exclosure.

Appendix Tables 7-15 list data collected from all tagged plants inside and immediately outside the exclosures for the years 1965 and 1966. This information may be useful for comparison to future readings.

It is recommended that the study summarized in Appendix Tables 1-15 be repeated every five years to determine basic trends.

FIGURE 2. EXCLOSURES AND LOCATION OF TAGGED PLANTS, SCUDDER CREEK DEER WINTER RANGE.



APPENDIX TABLE 1. CONDITION AND UTILIZATION OF MOUNTAIN MAHOGANY INSIDE AND OUTSIDE EXCLOSURES ON SCUDDER CREEK, 1964-66.

	Number of Plants	Number of Dead Plants	Form Class Percent					Age Class Percent				Average Percent Crown Dead	Leader Use	Average Plant Height (inches)	Untagged Plants	Total Plants in Exclosure	Percent Plants Producing Seed
			1	2	3	5	6	S	Y	M	D						
OUTSIDE EXCLOSURES																	
6-22 & 25-64	20 o[1]				85		15			15	85	65	99		155 uu[2]		25
4-26-65	20 o				85		15			30	70	62	90				
6-27-66	18 o	2			83		17				100	68	90	42			
6-26-64	10 uo		10	30	60				20	70	10	11	65	6			
4-26-65	9 uo	1		22	78				11	89		8	90	5			
6-27-66	8 uo	2		12	88					50	50	20	90	6			
KIRSCH'S EXCLOSURE																	
6-20 & 22-64	15 o	5			87		13			13	87	65	0				40
4-26-65	15 o	5	7	40	33	13	7			27	73	55	0				
6-27-66	14 o	7	36	50		14				43	57	38	0	45			
6-20 & 22-64	60 u		20	45	35				55	35	10	9	0	5	123 u[3]	203	
4-26-65	58 u	2	43	43	14				58	35	7	9	0	7			
6-27-66	52 u	7	63	25	12				33	64	3	5	0	8			
SOUTH'S EXCLOSURE																	
6-22-64	22T		55	45					5	90	5	8	0	5 u[4]	71 u[3]	93	67
4-26-65	22T		68	32					5	86	9	8	0	7 u			
6-27-66	22T		40	60					5	90	5	7	0	48 o 8 u	67 u[3]	89	

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[1] o = tagged overstory mahogany plant; uo = tagged understory mahogany plant growing in open; u = tagged understory mahogany plant; T = all tagged plants.

[2] uu = untagged understory growing under the canopy of 20 tagged overstory.

[3] u = untagged understory.

[4] u = understory; o = overstory plant.

APPENDIX TABLE 2. POPULATION STRUCTURE OF MOUNTAIN MAHOGANY PLANTS INSIDE THE SCUDDER CREEK EXCLOSURES, AUGUST 20, 1964.

Plant Category	Inside 1963 Exclosure	Inside 1953 Exclosure
Overstory	10% 1/	20% 1/
Understory Open	14%	33%
Understory Under Canopy	76%	47%
Sample Size	1/23 Acre	1/90 Acre
Total Plants	203	93
Plants/Acre	4,669	8,370

1/ Percent of total plants in each category.

APPENDIX TABLE 3. SCUDDER CREEK BROWSE TRANSECT #218; 100 TAGGED PLANTS ESTABLISHED AUGUST 20, 1964.

	OVERSTORY PLANTS			UNDERSTORY PLANTS GROWING IN OPEN						UNDERSTORY PLANTS GROWING UNDER OVERSTORY						
				FORM CLASS						FORM CLASS						
Plant Tag Number	Form Class No. 3	Age Class	% Crown Dead	1	2	3	Age Class	% Crown Dead	Height (ins.)	1	2	3	Age Class	% Crown Dead	Height (ins.)	Tag No. Overstory Plant
1						x	D	25	14							
2						x	D	75	12							
3						x	M	20	12							
4	x	D	30													
5	x	D	40													
6	x	D	25													
7	x	M	20													
8*						x	Y	20	3							
9*						x	D	40	7							
10*						x	M	0	7							
11	x	D	25													
12*						x	M	0	4							
13	x	D	70													
14*												x	D	40	3	13
15	x	M	20													
16	x	M	20													
17	x	D	50													
18* 1/												x	M	10	3	17
19	x	D	30													
20	x	D	75													
21	x	D	40													
22	x	D	50													
23*											x		M	0	4	24
24	x	D	60													
25	x	D	70													
26*						x	D	40	3							
27	x	D	25													
28	x	D	30													
29* 1/												x	Y	10	1	28
30	x	D	40													
31	x	D	40													
32*												x	M	10	4	31
33*												x	M	10	[illegible]	31

APPENDIX TABLE 3 (CONTINUED).

OVERSTORY PLANTS				UNDERSTORY PLANTS GROWING IN OPEN						UNDERSTORY PLANTS GROWING UNDER OVERSTORY						
				FORM CLASS						FORM CLASS						
Plant Tag Number	Form Class No. 3	Age Class	% Crown Dead	1	2	3	Age Class	% Crown Dead	Height (ins.)	1	2	3	Age Class	% Crown Dead	Height (ins.)	Tag No. Over-Story Plant
34	x	D	25													
35	x	D	60													
36	x	D	70													
37	x	D	80													
38*											x		Y	0	2	37
39	x	D	80													
40	x	D	30													
41* 1/											x		Y	20	2	40
42* 1/				x			S	0	1							
43	x	D	40													
44	x	D	80													
45* 1/											x		Y	0	4	44
46	x	D	25													
47						x	D	25	12							
48						x	D	50	14							
49* 1/						x	Y	0	2							
50	x	D	50													
51						x	D	75	8							
52	x	D	60													
53	x	D	40													
54*												x	M	0	3	53
55	x	D	25													
56*				x			Y	0	4							
57* 1/				x			Y	0	4							
58	x	D	80													
59	x	D	30													
60	x	M	20													
61 1/						x	D	50	16							
62	x	M	20													
63	x	M	20													
64						x	M	20	16							
65	x	M	20													
66						x	D	50	8							
67* 1/										x			Y	0	1	68
68	x	D	70													
69* 1/										x			S	0	1	68

APPENDIX TABLE 3 (CONTINUED).

	OVERSTORY PLANTS			UNDERSTORY PLANTS GROWING IN OPEN						UNDERSTORY PLANTS GROWING UNDER OVERSTORY						
				FORM CLASS						FORM CLASS						
Plant Tag Number	Form Class No. 3	Age Class	% Crown Dead	1	2	3	Age Class	% Crown Dead	Height (ins.)	1	2	3	Age Class	% Crown Dead	Height (ins.)	Tag No. Over-Story Plant
70*						x	D	25	1							
71*						x	D	40	1							
72*						x	D	25	1							
73	x	D	50													
74	x	D	25													
75						x	D	50	8							
76						x	D	75	16							
77						x	M	10	14							
78	x	D	30													
79						x	D	30	16							
80*												x	M	20	2	79
81						x	M	20	10							
82						x	M	20	16							
83						x	M	10	14							
84						x	M	20	12							
85	x	D	30													
86	x	D	40													
87*											x		Y	0	3	86
88*										x			S	0	1	86
89	x	D	25													
90*											x		Y	0	4	89
91*										x			Y	0	4	89
92*												x	Y	10	2	89
93						x	D	30	16							
94	x	M	20													
95	x	D	25													
96						x	D	70	16							
97						x	M	20	14							
98						x	M	10	14							
99						x	M	20	16							
100						x	M	20	12							

* Indicates that the tag number is attached to a metal spike (plant usually too small to attach tag directly).

1/ Indicates plants recorded as dead in May, 1967.

APPENDIX TABLE 4. MOUNTAIN MAHOGANY PLANTS INSIDE EXCLOSURE CONSTRUCTED IN 1953. MEASUREMENTS RECORDED JUNE 22, 1964.

Tagged Plant No.	FORM CLASS 1	FORM CLASS 2	FORM CLASS 3	FORM CLASS 6	Age Class	% of Crown Dead	Height of Plant (Inches)	Remarks
1 Overstory	x				M	0		
2 Overstory	x				M	0		
3 Overstory		x			M	10		
		x			Y	0	2	Plants under No. 3 (understory)
			x		M	20	3	
	x				Y	0	2	
	x				S	0	2	
	x				S	0	2	
	x				S	0	2	
	x				S	0	2	
		x			Y	10	2	
			x		Y	10	3	
4 Overstory		x			M	0		
	x				S	0		In open - (understory)
	x				S	0		
	x				S	0		
	x				S	0		
5 Overstory		x			M	5		
	x				S	0		Plants under No. 5 (understory)
	x				S	0		
	x				S	0		
	x				S	0		
			x		Y	20		
6 Overstory	x				M	0		
7 Overstory		x			M	0		
	x				Y	0		Plants under No. 7 (understory)
	x				Y	0		
	x				S	0		
	x				S	0		In open - (understory)
	x				S	0		
	x				S	0		
	x				S	0		
	x				S	0		
			x		Y	10		
			x		Y	20		
		x			Y	0		
			x		D	40	2	
8 Understory	x				Y	0	3	
	x				S	0		
	x				S	0		
	x				S	0		
	x				S	0		
	x				S	0		
	x				S	0		
		x			M	20		
	x				S	0		
	x				S	0		
	x				S	0		
			x		Y	5		

APPENDIX TABLE 4 (CONTINUED).

Tagged Plant No.	FORM CLASS 1	2	3	6	Age Class	% of Crown Dead	Height of Plant (Inches)	Remarks
9 Overstory	x				M	0		
			x		D	60	1	Plant under No. 9
10 Overstory		x			M	0	18	
11 Overstory	x				M	5		
12 Overstory	x				M	5		
			x		M	20	1	In open - (understory)
	x				Y	0		
13 Overstory	x				M	20		
			x		M	5		Plants under No. 13 (understory)
			x		Y	0		
			x		M	0		
14 Understory		x			M	0	6	In open - (understory)
15 Understory		x			M	0	4	
			x		M	0		
16 Overstory	x				M	10		
17 Overstory		x			M	5		
	x				S	0		Plants under No. 17 (understory)
		x			Y	0		
		x			Y	0		
18 Overstory	x				D	50		
19 Overstory	x				M	20		
	x				S	0		Plants under No. 18 and 19 (understory)
	x				S	0		
	x				S	0		
	x				S	0		
	x				S	0		
	x				S	0		
	x				S	0		
	x				S	0		
	x				S	0		
	x				S	0		
	x				S	0		
	x				S	0		
	x				S	0		
	x				Y	0		
			x		M	0		
			x		M	20		
	x				Y	0		
		x			Y	0		
			x		M	10		
			x		M	0		
20 Understory	x				M	10	6	
21 Overstory		x			M	5	20	
22 Overstory		x			M	20	16	

APPENDIX TABLE 5. MOUNTAIN MAHOGANY PLANTS INSIDE EXCLOSURE CONSTRUCTED DECEMBER 5, 1963. MEASUREMENTS RECORDED JUNE 20 and 22, 1964.

Tagged Plant No. Tag on Plant	Tag on Rod	FORM CLASS 1	2	3	6	Age Class	Percent of Crown Dead	Leader Use 1963 Growth	Height of Plants (inches)	Remarks
1 Overstory				x		D	80	0		
			x			Y	0	0		Plants under No. 1 (understory)
			x			Y	0	0		
			x			Y	0	0		
		x				Y	0	0		
			x			Y	20	0		
				x		Y	0	0		
				x		Y	0	0		
	4		x			M	0	0	7	
	2		x			M	10	0	6	In open-understory
3 Overstory					x	D	40	0		
			x			Y	10	0		Plants under No. 3 (understory)
		x				Y	0	0		
				x		Y	20	0		
				x		Y	10	0		
			x			Y	0	0		
			x			Y	0	0		
			x			Y	0	0		
			x			Y	0	0		
			x			Y	0	0		
				x		Y	0	0		
	5		x			Y	0	0	6	In open-understory
	6		x			Y	0	0	6	In open-understory
7 Overstory				x		D	80	0		
				x		Y	0	0		Plants under No. 7 (understory)
			x			Y	10	0		
				x		Y	0	0		
				x		Y	0	0		
		x				Y	0	0		
				x		Y	20	0		
		x				Y	0	0		
		x				Y	0	0		
			x			Y	0	0		
			x			Y	0	0		
			x			Y	0	0		
			x			Y	0	0		
		x				Y	0	0		
	8	x				M	0	0	7	
9 Overstory				x		D	90	0		
	10			x		M	10	0	6	Plants under No. 9 (understory)
			x			Y	0	0		
	11	x				M	0	0	7	
	12		x			M	0	0	6	
3 Overstory			Dead							

APPENDIX TABLE 5 (CONTINUED).

Tagged Plant No.		FORM CLASS								
Tag on Plant	Tag on Rod	1	2	3	6	Age Class	Percent of Crown Dead	Leader Use 1963 Growth	Height of Plants (inches)	Remarks
	14			x		D	30	0	6	Plants under No. 13 (understory)
	15		x			M	0	0	5	
	16		x			Y	0	0	4	
	17	x				Y	0	0	8	
	19		x			Y	0	0	3	
	18			x		D	80	0	2	In open-understory
20 Overstory				x		D	99	0		
				x		Y	20	0		Plants under No. 20 (understory)
				x		Y	20	0		
				x		Y	10	0		
		x				Y	0	0		
	21	x				Y	0	0	8	In open-understory
22 Overstory				x		D	40	0		
				x		Y	20	0		Plants under No. 22 (understory)
			x			Y	0	0		
23 Overstory				x		D	60	0		
			x			Y	20	0		Plants under No. 23 (understory)
			x			Y	0	0		
		x				Y	0	0		
				x		D	50	0	5	
				x		D	40	0	5	
				x		D	50	0	3	
				x		D	50	0	3	
				x		D	40	0	3	
		x				Y	0	0		
	24	x				Y	0	0	7	
25 Overstory			Dead							
26 Overstory				x		D	50	0		
		x				Y	0	0		Plants under No. 26 (understory)
			x			Y	0	0		
		x				Y	0	0		
			x			Y	0	0		
			x			Y	0	0		
				x		D	50	0	1	
				x		D	50	0	1	
			x			Y	20	0		
				x		M	20	0	5	
				x		D	40	0	5	
				x		D	90	0	1	
	27	x				Y	0	0	7	
28 Overstory			Dead							
	29			x		M	20	0	4	Plants under No. 28 (understory)
			x			Y	0	0		
				x		Y	20	0		
				x		Y	20	0		
				x		Y	20	0		
				x		D	50	0	1	
			x			Y	0	0		
		x				Y	0	0		
	30		x			Y	0	0	8	
	31	x				M	0	0	10	In open-understory

APPENDIX TABLE 5 (CONTINUED).

Tagged Plant No.		FORM CLASS				Age Class	Percent of Crown Dead	Leader Use 1963 Growth	Height of Plants (inches)	Remarks
Tag on Plant	Tag on Rod	1	2	3	6					
32 Overstory				x		D	90	0		
	33	x				Y	0	0	11	Plants under No. 32 (understory)
				x		Y	20	0		
			x			Y	20	0		
				x		Y	20	0		
				x		Y	20	0		
				x		Y	0	0		
		x				Y	0	0		
		x				S	0	0		
	34	x				Y	0	0	8	
		x				Y	0	0		
		x				Y	0	0		
				x		D	40	0		
	35			x		D	30	0	5	
				x		D	50	0		
	36			x		D	30	0	5	
	37			x		Y	10	0	4	
	38		x			Y	20	0	4	
	39			x		D	30	0	3	
	40		x			Y	0	0	3	
	41		x			Y	10	0	3	
42 Overstory				x		D	70	0		
		x				Y	0	0		Plants under No. 42 (understory)
			x			Y	0	0		
				x		Y	0	0		
				x		Y	20	0		
				x		Y	0	0		
				x		Y	20	0		
		x				Y	0	0		
43 Overstory				x		M	10	0	16	
			x			Y	0	0	2	Under No. 43-understory
	44		x			Y	20	0	2	Plants in open (understory)
	45		x			M	10	0	4	
	46		x			Y	0	0	2	
	47		x			Y	0	0	4	
	48			x		M	20	0	5	
	49		x			Y	0	0	1	
	50		x			Y	0	0	2	
	51	x				Y	0	0	2	
56 Overstory				x		M	20	0	24	
	52		x			M	0	0	8	Plants under No. 56 (understory)
	53			x		Y	10	0	4	
	54		x			Y	0	0	6	
		x				Y	0	0		
	55		x			Y	0	0	4	

APPENDIX TABLE 5 (CONTINUED).

Tagged Plant No. Tag on Plant	Tag on Rod	FORM CLASS 1	2	3	6	Age Class	Percent of Crown Dead	Leader Use 1963 Growth	Height of Plants (inches)	Remarks
	57			x		M	20	0	5	Plants in open (understory)
	58		x			M	20	0	8	
	59		x			M	0	0	8	
	60			x		Y	10	0	1	
	61	x				Y	0	0	2	
		x				Y	0	0	1	
	62		x			Y	10	0	2	
	63			x		Y	10	0	3	
				x		Y	0	0	2	
				x		Y	0	0	2	
				x		Y	10	0	2	
64 Overstory			Dead							
			x			Y	0	0		Plants under No. 64 (understory)
	65			x		M	20	0	5	
				x		Y	0	0		
				x		Y	20	0		
		x				S	0	0		
				x		Y	20	0		
		x				S	0	0		
66 Overstory					x	D	80	0		
		x				Y	0	0		Plants under No. 6 (understory)
		x				Y	0	0		
			x			Y	0	0		
68 Overstory				x		D	95	0		
	67			x		M	0	0	6	Plants under No. 68 (understory)
				x		D	30	0	5	
			x			M	20	0	8	
			x			M	0	0	7	
			x			Y	20	0	5	
69 Overstory			Dead							
				x		D	30	10	6	Plants under No. 69 (understory)
				x		M	20	0	4	
				x		M	20	0	2	
				x		M	20	0	2	
				x		M	20	0	5	
				x		M	20	0	5	
			x			M	0	0	4	
				x		D	80	0	1	
				x		M	0	0	4	
				x		M	10	0	6	
				x		M	0	0	5	
				x		M	0	0	4	
				x		M	0	0	4	
			x			Y	0	0	3	
			x			Y	0	0	4	
				x		M	20	0	1	
	70			x		M	0	0	4	Plants in open (understory)
	71		x			Y	0	0	3	
	72			x		M	20	0	6	

APPENDIX TABLE 5 (CONTINUED).

Tagged Plant No.		FORM CLASS								
Tag on Plant	Tag on Rod	1	2	3	6	Age Class	Percent of Crown Dead	Leader Use 1963 Growth	Height of Plants (inches)	Remarks
73 Overstory				x		D	70	0		
				x		Y	20	0		
		x				Y	0	0		
				x		Y	20	0		
				x		Y	10	0		
				x		D	60	0	3	
				x		D	30	0	2	Plants under No. 73 (understory)
			x			Y	10	0		
				x		Y	20	0	2	
	74		x			M	0	0	8	
				x		M	20	0	5	
				x		D	30	0	3	
	75		x			M	0	0	7	
	76			x		D	50	0	6	In open-understory

APPENDIX TABLE 6. MOUNTAIN MAHOGANY PLANTS OUTSIDE EXCLOSURES. MEASUREMENTS RECORDED JUNE 22 AND 25, 1964.

Tagged Plant No.	FORM CLASS 1	FORM CLASS 2	FORM CLASS 3	FORM CLASS 6	Age Class	Percent of Crown Dead	Leader Use 1963 Growth	Height of Plants (inches)	Remarks
1 Overstory			x		D	80	99		
			x		M	20	90	3	Plants under No. 1 (understory)
	x				Y	0	5	2	
	x				Y	0	0	2	
			x		M	20	5	2	
			x		M	20	5	2	
			x		M	0	10	2	
		x			Y	0	0	2	
			x		M	10	0	2	
			x		Y	20	10	1	
	x				Y	0	0	1	
		x			Y	0	0	2	
	x				Y	0	0	2	
			x		M	0	10	1	
	x				S	0	0	1	
2 Overstory			x		M	20	100	18	
3 Overstory			x		D	75	100		
		x			Y	0	0	3	Plants under No. 3 (understory)
		x			Y	20	50	2	
		x			Y	0	0	3	
		x			M	0	0	6	
			x		D	60	10	4	
		Dead Plant							
		x			Y	0	10	1	
		x			M	0	10	4	
		x			Y	10	0	1	
	x				Y	0	0	1	
			x		M	20	0	2	
		x			Y	20	0	2	
		x			Y	0	0	2	
			x		Y	10	0	1	
4 Overstory			x		D	80	100		
			x		M	20	50	2	Plant under No. 4
5 Overstory			x		D	60	100		
			x		M	10	0	3	Plants under No. 5 (understory)
			x		D	50	90	5	
			x		D	90	0	8	
6 Overstory			x		D	99	100		
			x		D	50	0	1	Plants under No. 6 (understory)
			x		D	90	0	1	
	x				Y	0	0	6	
			x		M	20	50	3	
			x		M	20	50	4	
		x			M	0	0	8	
	x				Y	0	0	4	
			x		M	0	50	2	
	x				S	0	0	1	
	x				Y	0	0	1	
		x			M	0	10	2	
			x		D	50	0	1	

APPENDIX TABLE 6 (CONTINUED).

Tagged Plant No.	FORM CLASS				Age Class	Percent of Crown Dead	Leader Use 1963 Growth	Height of Plants (inches)	Remarks
	1	2	3	6					
7 Overstory				x	D	80	100		
	x				Y	0	0	3	Plants under No. 7 (understory)
		x			Y	0	0	1	
			x		M	20	80	3	
			x		M	20	50	1	
			x		Y	10	10	1	
		x			Y	20	5	2	
			x		M	20	50	2	
	x				Y	0	50	5	
		x			Y	0	50	4	
		x			Y	10	10	4	
8 Overstory			x		D	95	100		
		Dead Plant							Plants under No. 8 (understory)
		Dead Plant							
		Dead Plant							
		x			Y	0	0	1	
		x			Y	0	5	1	
			x		M	10	100	1	
			x		M	10	50	1	
			x		D	60	0	1	
			x		Y	0	0	1	
			x		M	0	100	1	
			x		Y	10	90	1	
			x		Y	10	90	1	
			x		Y	10	90	1	
			x		Y	10	90	1	
			x		Y	10	90	1	
			x		Y	10	90	1	
	x				Y	0	100	6	
			x		M	0	80	2	
	x				Y	0	0	1	
			x		M	10	50	2	
	x				S	0	0	1	
	x				M	10	0	6	
9 Overstory			x		D	30	100	24	
			x		M	0	0	1	Plants under No. 9 (understory)
			x		Y	10	0	1	
	x				S	0	0	1	
	x				S	0	0	1	
	x				S	0	0	1	
	x				Y	0	0	1	
			x		Y	20	50	1	
		x			Y	0	0	2	
			x		M	0	25	2	
0 Overstory			x		M	15	90	10	
11 Overstory			x		D	95	90		
	x				M	0	0	3	Plants under No. 11 (understory)
		x			M	0	0	3	

APPENDIX TABLE 6 (CONTINUED).

Tagged Plant No.	FORM CLASS 1	2	3	6	Age Class	Percent of Crown Dead	Leader Use 1963 Growth	Height of Plants (inches)	Remarks
12 Overstory				x	D	80	100		
			x		M	0	10	3	Plant under No. 12
13 Overstory			x		D	90	100		
	x				S	0	0	1	Plants under No. 13 (understory)
	x				S	0	0	1	
		x			M	0	80	2	
			x		M	20	100	1	
			x		M	20	100	1	
	x				Y	0	0	1	
		x			Y	0	100	1	
		x			M	0	0	2	
14 Overstory				x	D	70	95		
		x			Y	20	100	2	Plants under No. 14 (understory)
			x		Y	20	100	2	
	x				Y	0	0	2	
			x		Y	10	50	2	
	x				Y	0	0	1	
	x				Y	0	0	1	
	x				Y	0	0	3	
	x				Y	0	0	1	
			x		Y	10	25	1	
			x		Y	20	50	1	
			x		M	0	0	2	
		x			M	0	0	2	
	x				Y	0	0	4	
	x				Y	0	0	4	
	x				Y	0	0	3	
			x		Y	0	0	2	
	x				Y	0	0	2	
	x				S	0	0	1	
		x			M	20	80	2	
	x				Y	0	0	2	
	x				Y	0	0	5	
15 Overstory			x		D	65	100		
	x				M	0	25	8	Plants under No. 15 (understory)
			x		D	30	10	1	
	x				Y	0	0	3	
	x				Y	0	0	1	
	x				Y	0	0	1	
			x		Y	0	25	2	
	x				Y	0	0	1	
			x		M	20	100	1	
16 Overstory			x		D	95	100		
			x		D	50	100	3	Plants under No. 16 (understory)
		x			M	0	5	4	
	x				S	0	0	1	
	x				Y	10	50	8	
			x		M	20	50	2	

APPENDIX TABLE 6 (CONTINUED).

Tagged Plant No.	FORM CLASS				Age Class	Percent of Crown Dead	Leader Use 1963 Growth	Height of Plants (inches)	Remarks
	1	2	3	6					
17 Overstory			x		D	95	100		
			x		M	0	0	2	Plants under No. 17 (understory)
			x		Y	20	50	2	
		x			M	0	50	2	
		x			Y	0	50	2	
		x			D	50	25	1	
		x			D	50	25	3	
		x			M	0	25	6	
			x		D	50	10	3	
			x		D	60	10	3	
		x			M	0	0	5	
			x		D	30	25	3	
			x		M	20	50	3	
			x		M	0	0	1	
			x		Y	0	0	2	
			x		Y	0	0	2	
			x		Y	0	0	2	
18 Overstory			x		D	25	100	20	
			x		M	0	50	1	Plants under No. 18 (understory)
			x		M	0	0	1	
			x		M	0	0	2	
		x			Y	0	0	2	
	x				M	0	25	6	
			x		M	20	90	5	
	x				Y	0	0	8	
		x			Y	0	0	2	
	x				Y	0	0	4	
		x			Y	0	25	2	
		x			Y	0	100	2	
19 Overstory			x		M	20	100	13	
20 Overstory			x		D	30	100	24	
		x			Y	10	100	2	Plants under No. 20 (understory)
			x		M	20	90	8	

APPENDIX TABLE 7. MOUNTAIN MAHOGANY CONDITION READINGS FOR ALL TAGGED PLANTS INSIDE 1963 EXCLOSURE, APRIL 26, 1965.

Plant No.	Union*	Form Class	Age Class	% Crown Dead	Plant Height**	Plant No.	Union*	Form Class	Age Class	% Crown Dead	Plant Height**	Plant No.	Union*	Form Class	Age Class	% Crown Dead	Plant Height**
1	o	2	D	80		28	o		Dead			55	u	2	M	0	5
2	u	2	M	0	8	29	u	3	D	60	4	56	o	2	M	20	
3	o	5	M	20		30	u	1	Y	0	12	57	u	2	M	0	7
4	u	1	M	0	9	31	u	1	M	0	12	58	u	2	M	0	10
5	u	1	Y	0	9	32	o	3	D	60		59	u	1	M	0	12
6	u	1	Y	0	9	33	u	1	Y	0	14	60	u	2	Y	0	2
7	o	5	D	75		34	u	1	M	0	12	61	u	1	Y	0	2
8	u	1	M	0	9	35	u	3	D	25	3	61	u	1	Y	0	2
9	o	3	D	95		36	u	3	D	30	4	62	u	2	Y	0	1
10	u	2	Y	0	11	37	u	3	M	10	4	63	u	1	Y	0	3
11	u	1	Y	0	10	38	u	2	Y	20	4	63	u	1	Y	0	3
12	u	1	Y	0	10	39	u	2	Y	20	5	63	u	1	Y	0	3
13	o		Dead			40	u	3	Y	10	2	63	u	1	Y	0	3
14	u	2	Y	20	10	41	u	2	Y	90	2	64	o		Dead		
15	u	2	Y	0	7	42	o	2	D	60		65	u	2	M	0	8
16	u	3	Y	0	4	43	o	1	M	0		66	o	6	D	70	
17	u	1	Y	0	10	44	u	2	Y	20	2	67	u	1	M	0	10
18	u		Dead			45	u	2	M	20	7	68	o	3	D	80	
19	u	2	Y	20	6	46	u	3	Y	60	2	69	o		Dead		
20	o	3	D	99		47	u	2	Y	0	6	70	u	2	M	0	8
21	u	1	M	0	11	48	u	2	M	20	7	71	u	2	Y	0	4
22	o	2	M	20	24	49	u	2	Y	0	3	72	u	2	M	20	10
23	o	3	D	45		50	u		Dead			73	o	2	D	60	
24	u	1	Y	0	12	51	u	2	Y	0	3	74	u	2	M	20	11
25	o		Dead			52	u	1	M	0	14	75	u	1	M	0	10
26	o	2	D	35		53	u	2	Y	0	5	76	u	3	D	50	9
27	u	1	Y	0	8	54	u	1	Y	0	10						

* o = overstory. u = understory.

** Height in inches.

APPENDIX TABLE 8. MOUNTAIN MAHOGANY CONDITION READINGS FOR ALL TAGGED PLANTS INSIDE 1963 EXCLOSURE, JUNE 27, 1966.

Plant No.	Union*	Form Class	Age Class	% Crown Dead	Plant Height**
1	o	2	D	75	36
2	u	1	M	0	12
3	o	5	M	20	72
4	u	1	M	0	12
5	u	1	M	0	12
6	u	1	M	0	12
7	o	2	D	50	60
8	u	1	M	0	12
9	o		Dead		
10	u	1	M	0	12
11	u		Dead		
12	u	2	M	0	8
13			Dead		
14	u	3	Y	50	2
15	u	2	M	0	3
16	u	1	M	0	7
17	u		Dead		
18	u		Dead		
19	u	3	Y	50	2
20	o		Dead		
21	u		Dead		
22	o	2	M	20	24
23	o	2	D	40	60
24	u	3	Y	40	6
25	o		Dead		
26	o	2	M	20	48
27	u	2	Y	10	6
28	o		Dead		
29	u	2	M	5	4
30	u	1	M	0	14
31	u	1	M	0	14
32	o	1	D	50	48
33	u	1	M	0	18
34	u	1	M	0	18
35	u	2	D	35	3
36	u	2	Y	5	4
37	u	2	Y	5	3
38	u	1	Y	0	4
39	u	1	M	0	6
40	u	3	Y	0	2
41	u	3	Y	5	2
42	o	2	D	50	36
43	o	1	M	0	26
44	u	1	M	0	4
45	u	1	M	0	12
46	u	2	Y	0	3
47	u	1	M	0	8
48	u	1	M	0	10
49	u	2	Y	0	3
50	u	2	Y	0	1
51	u	3	D	25	2
52	o	1	M	0	24
53	u	1	M	0	10
54	u	1	M	0	14
55	u	1	M	0	10
56	o	1	M	10	30
57	u	1	M	0	10
58	u	1	M	5	14
59	u		Dead		
60	u		Dead		
61	u	1	Y	0	3
61	u	1	Y	0	3
62	u		Dead		
63	u	2	M	5	5
63	u	1	Y	0	5
63	u	1	Y	0	5
63	u	1	Y	0	5
64	o		Dead		
65	u	2	M	5	7
66	o	5	D	80	78
67	u	1	M	0	18
68	o	2	D	80	36
69	o		Dead		
70	u	1	M	0	12
71	u	1	M	0	6
72	u	1	M	0	16
73	o	1	D	40	36
74	u	1	M	0	12
75	u	1	M	0	14
76	u	2	M	10	10

* o = overstory. u = understory.

** Height in inches.

APPENDIX TABLE 9. CONDITION OF TAGGED MOUNTAIN MAHOGANY PLANTS INSIDE 1953 EXCLOSURE, APRIL 26, 1965.

Plant No.	Union*	Form Class 1	Form Class 2	Age Class	Percent of Crown Dead	Plant Height (inches)	Untagged Reproduction
1	o	x		M	0	20	NO OBSERVATIONS MADE.
2	o	x		M	0	18	
3	o		x	D	30		
4	o	x		M	0		
5	o	x		M	0		
6	o	x		M	0		
7	o	x		D	25		
8	u	x		Y	0	5	
9	o	x		M	0		
10	o	x		M	10		
11	o	x		M	10		
12	o	x		M	10		
13	o	x		M	20		
14	u		x	M	0	7	
15	u		x	M	0	4	
16	o	x		M	10		
17	o		x	M	20		
18	o		x	M	10		
19	o	x		M	10		
20	u	x		M	0	12	
21	o		x	M	0	19	
22	o		x	M	10		

* o = overstory over 18" tall.
u = understory under 18" tall.

APPENDIX TABLE 10. CONDITION OF TAGGED MOUNTAIN MAHOGANY PLANTS INSIDE 1953 EXCLOSURE, JUNE 27, 1966.

Plant No.	Union*	Form Class 1	Form Class 2	Age Class	Percent of Crown Dead	Plant** Height (inches)	Untagged Reproduction
1	o	x		M	0	24	0
2	o	x		M	0	22	0
3	o		x	M	10	60	8
4	o		x	M	0	42	4
5	o		x	M	5	60	4
6	o	x		M	0	48	2
7	o	x		M	0	48	8
8	u		x	Y	10	7	7
9	o	x		M	5	72	3
10	o		x	M	5	20	1
11	o		x	M	10	60	1
12	o		x	M	10	60	0
13	o		x	M	20	60	3
14	u		x	M	5	9	3
15	u		x	M	5	7	3
16	o		x	M	20	72	3
17	o		x	M	10	60	0
18	o		x	M	10	42	0
19	o	x		D	25	60	14
20	u	x		M	0	10	0
21	o	x		M	0	24	2
22	o	x		M	0	22	1

* o = overstory plants over 18" tall.
u = understory plants under 18" tall.

** Estimated for overstory.

APPENDIX TABLE 11. CONDITION AND UTILIZATION OF TAGGED OVERSTORY MOUNTAIN MAHOGANY PLANTS OUTSIDE THE SCUDDER CREEK EXCLOSURES, APRIL 26, 1965.

Tag No.	Form Class				Age Class	Percent of Crown Dead	Leader Use 1964 Growth
	1	2	3	6			
1			x		D	60	90%
2			x		M	20	"
3			x		D	75	"
4			x		D	90	"
5			x		D	60	"
6			x		D	99	"
7				x	D	75	"
8			x		D	90	"
9			x		M	20	"
10			x		M	20	"
11			x		D	90	"
12				x	D	75	"
13			x		D	90	"
14				x	D	90	"
15			x		D	50	"
16			x		D	90	"
17			x		D	80	"
18			x		M	20	"
19			x		M	20	"
20			x		M	20	"
			85%	15%	M = 30% D = 70%	62%	90%

APPENDIX TABLE 12. CONDITION AND UTILIZATION OF TAGGED OVERSTORY MOUNTAIN MAHOGANY PLANTS OUTSIDE THE SCUDDER CREEK EXCLOSURES, JUNE 27, 1966.

Tag No.	Form Class 1	2	3	6	Age Class	Percent of Crown Dead	Leader Use 1964 Growth	Height in Inches
1			x		D	75	90%	30
2			x		D	35	"	19
3		Dead						
4			x		D	90	"	48
5			x		D	90	"	24
6		Dead						
7				x	D	80	"	84
8			x		D	90	"	36
9			x		D	40	"	30
10			x		D	25	"	12
11			x		D	95	"	48
12				x	D	60	"	84
13			x		D	95	"	30
14				x	D	95	"	84
15			x		D	40	"	60
16			x		D	95	"	60
17			x		D	95	"	48
18			x		D	40	"	24
19			x		D	35	"	12
20			x		D	40	"	24
			83%	17%	100%	68%	90%	42"

APPENDIX TABLE 13. CONDITION AND UTILIZATION OF TAGGED UNDERSTORY MOUNTAIN MAHOGANY PLANTS OUTSIDE THE SCUDDER CREEK EXCLOSURES, JUNE 26, 1964.

Tag No.	Form Class 1	Form Class 2	Form Class 3	Age Class	Percent of Crown Dead	Leader Use 1963 Growth	Plant Height (Inches)
1		x		M	0	50	15
2		x		M	15	25	4
3			x	D	35	90	4
4			x	M	20	100	7
5			x	M	15	90	3
6	x			Y	0	0	3
7			x	M	5	95	5
8		x		Y	0	0	3
9			x	M	10	100	3
10			x	M	10	100	8
	10%	30%	60%	M = 70% Y = 20% D = 10%	11%	65%	6"

APPENDIX TABLE 14. CONDITION AND UTILIZATION OF TAGGED UNDERSTORY MOUNTAIN MAHOGANY PLANTS OUTSIDE THE SCUDDER CREEK EXCLOSURES, APRIL 26, 1965.

Tag No.	Form Class 1	Form Class 2	Form Class 3	Age Class	Percent of Crown Dead	Leader Use 1964 Growth	Plant Height (Inches)
1		x		M	0	90	12
2			x	M	20	90	3
3			x	M	0	90	3
4			x	M	20	90	7
5			x	M	20	90	3
6		Dead					
7			x	M	0	90	3
8			x	Y	0	90	1.5
9			x	M	10	90	2.5
10		x		M	5	90	8
		22%	78%	M = 89% Y = 11%	8%	90%	5"

APPENDIX TABLE 15. CONDITION AND UTILIZATION OF TAGGED UNDERSTORY MOUNTAIN MAHOGANY PLANTS OUTSIDE THE SCUDDER CREEK EXCLOSURES, JUNE 27, 1966.

Tag No.	Form Class			Age Class	Percent of Crown Dead	Leader Use 1965 Growth	Plant Height (Inches)
	1	2	3				
1			x	D	25	90	12
2			x	D	25	"	2
3			x	M	10	"	4
4			x	D	25	"	7
5			x	D	25	"	4
6		Dead					
7			x	M	20	"	4
8		Dead					
9			x	M	20	"	7
10		x		M	10	"	10
		12%	88%	M = 50% D = 50%	20%	90%	6"

S
639.9
W-73-R-10
A-1 (ELK)

Dist. 3
Species - Elk

JOB COMPLETION REPORT
INVESTIGATIONS PROJECT

State of: Montana

Name; Wildlife Investigations -District 3

Project No.: W-73-R-8-9-10

Title: Big Game Surveys and Investigations - Elk Surveys and Investigations

Job No.: A - 1

Period Covered: July 1, 1962 to June 30, 1965

Abstract:

Elk management information collected during the period July 1962 to June 1965 is presented under three major categories; harvest, range and population.

Harvest information obtained via postal questionnaires indicates elk harvests (point estimate) in the district for the years 1962, 1963 and 1964 was 4207, 3275 and 4932 respectively. Use of 95% confidence limits for these point estimates shows a decline in the harvest from 1962 to 1963 but the 1964 harvest was greater than either 1962 or 1963. Detailed information pertaining to harvest, sex and age ratios and numbers of hunters contacted is presented for the 1962 elk season in the Gravelly Mountains (Area 33). The 1964-65 Special Upper Gallatin elk season is discussed as well as the February 1965 Special elk season at Gardiner (Area 313). During the latter season some 750 elk were harvested by hunters in the eight day hunt. Information collected at checking stations operated during the three day either sex season in Area 38 (Radersburg) show 61 elk were checked.

Presented in the section under population are results of aerial surveys for many of the major elk wintering areas in the district. Some data collected in 1961 and not previously reported is also given. The greatest value in this information lies in its application to trends in population increases and decreases as well as to distribution patterns. Interpretation of aerial survey figures is virtually meaningless without reference to weather and observation conditions. Information on conditions and trends of various elk winter ranges was obtained by several range measuring techniques. Daubenmire plots, pace transects, line transects, clipped plots and agronomy cages were all used to evaluate condition and trend of elk winter ranges. The information available indicates most of the elk winter ranges in only fair condition with certain ones in extremely poor condition. In many instances, in the case of extremely poor range conditions, livestock grazing practices are directly involved. Limited results of an elk marking program are presented. The results indicate some degree of association between elk frequenting the Upper West Fork of the Madison, the Upper Ruby River and the Upper Blacktail drainages.

A consideration of four range evaluation methods is discussed.

Objective:

To obtain quantitative data for the management of big game (elk) populations. Data will be from range, population trend and hunter surveys and supplemental studies. Results of surveys and investigations will be presented by management units. Such units defined as the district management units described on the hunter map.

Procedures:

1. Range Surveys

   A. Range surveys will be conducted according to standardized procedures described in the Department's Range Survey Guide.

B. Supplemental range surveys, using other than the department's standard procedures, may also be conducted where needed.

2. Population Trend Surveys

   A. Trends in population size will be determined by methods applicable to species.

   B. Trends in population productivity and rates of increase will be determined from herd composition data.

   C. Trends in population mortality will be determined by appropriately spaced adult-young ratio counts or dead animal counts on sample plots.

3. Hunter Harvest Surveys

   A. A statewide questionnaire will be used to determine the hunter success and numbers of animals harvested on a statewide, district and management unit basis.

   B. Checking stations will be used where supplemental harvest information and biological data are desired.

4. Supplemental Studies

   A. Food habits and forage preferences will be investigated by feeding site examinations and/or rumen analyses. Rumen analysis will be conducted by the State Fish and Game Laboratory.

   B. Movements within home ranges and migratory habits will be investigated by the use of marked and/or tagged animals.

   C. Relationships to domestic livestock or agricultural crops will be investigated by methods applicable to the situation.

Findings:

A considerable back-log of information had accumulated and this report is designed to present this information without benefit of extensive analysis. This report should be considered as a source of reference material to facilitate analysis of information presented in succeeding reports.

Elk Harvest

A three year summary (1962-64) of elk harvests in the district appears in Table 1. The information represents an analysis and subsequent expansion of data received on postal questionnaires. The greatest value of the information is determining the trend of the harvest. The column headed "range" under Hunters and Harvest are the 95% confidence limits of the expanded data. The "point" heading is the point estimate of the numbers of hunters hunting and the number of elk killed. It is not advisable to use the point estimate of harvest without considering the range.

A comparison of resident and non-resident elk harvest is given in Table 2. It is interesting to note the non-resident harvested 15.5%, 19% and 15.5% of the elk in 1962, 1963, and 1964 respectively. The information in Table 2 also indicates non-residents are somewhat more successful than residents in bagging elk. Sex and age of elk harvested in District Three for 1962-64 are given in Table 3. In 1962, spikes comprised about 14% of the elk harvested, in 1963 about 10% and in 1964, 16%. The percent of older bulls in

TABLE 1. DISTRICT THREE ELK HARVEST, 1962-1964.

Area	Year	Hunters		Harvest		Percent Successful
		Point	Range	Point	Range	
30	1962	316	186-445	110	33-186	34.7
	1963	643	454-831	87	27-147	13.5
	1964	510	450-571	117	92-142	23.0
31	1962	1549	1264-1834	344	209-479	22.2
	1963	2133	1791-2475	381	255-506	17.8
	1964	1909	1792-2026	393	347-439	20.6
32	1962	1514	1232-1796	471	313-629	31.1
	1963	2120	1779-2460	485	346-625	22.9
	1964	1665	1556-1774	465	417-514	27.9
33	1962	5082	4573-5592	1424	1150-1697	28.0
	1963	2824	2432-3217	188	94-281	6.6
	1964	2068	1947-2189	255	216-294	12.3
34	1962	568	395-742	151	62-241	26.6
	1963	374	230-518	30	0-70	8.1
	1964	247	205-290	25	12-37	10.0
35	1962	713	519-907	100	27-173	14.1
	1963	736	534-938	137	56-217	18.5
	1964	643	575-711	85	62-108	13.2
	1962	559	387-731	59	3-115	10.5
	1963	783	575-992	218	131-305	27.8
	1964	582	517-647	154	126-181	26.5
37	1962	202	99-306	65	6-124	32.3
	1963	342	204-480	76	18-134	22.2
	1964	137	106-169	37	23-51	26.9
38	1962	548	377-718	73	11-135	13.3
	1963	985	751-1218	130	51-208	13.2
	1964	904	823-985	214	179-248	23.7
39	1962	1214	961-1466	231	120-341	19.0
	1963	822	609-1035	99	29-169	12.1
	1964	700	629-771	137	108-165	19.6
310	1962	1236	981-1491	235	123-346	19.0
	1963	1415	1136-1694	321	213-429	22.7
	1964	1563	1457-1669	756	703-809	48.4
311	1962	1375	1107-1644	275	154-396	20.0
	1963	2102	1762-2441	345	222-468	16.4
	1964	1976	1858-2095	501	449-552	25.3
312	1962	694	502-885	151	62-241	21.8
	1963	663	472-855	76	15-137	11.4
	1964	406	352-460	70	49-90	17.1

TABLE 1 - CONTINUED.

Area	Year	Hunters		Harvest		Percent Successful
		Point	Range	Point	Range	
313	1962	802	596-1008	57	2-113	7.2
	1963	414	262-565	76	19-133	18.3
	1964	1577	1471-1683	1026	975-1077	65.0
314	1962	382	240-524	29	0-68	7.5
	1963	552	377-727	108	40-175	19.5
	1964	567	503-631	161	133-190	28.4
315	1962	No Season				
	1963	No Season				
	1964	No Season				
316	1962	329	197-461	37	0-81	11.1
	1963	390	243-537	101	42-159	25.8
	1964	471	412-529	99	76-121	21.0
317	1962	318	188-448	29	0-68	9.0
	1963	490	325-654	46	0-93	9.3
	1964	504	444-565	125	99-151	24.8
318	1962	639	455-823	129	46-212	20.2
	1963	775	568-982	137	56-217	17.6
	1964	623	556-691	117	91-144	18.8
319	1962	782	579-985	172	76-268	22.0
	1963	425	271-578	61	6-116	14.3
	1964	445	389-502	80	58-102	17.9
320	1962	505	341-668	67	7-126	13.2
	1963	496	330-662	39	0-83	7.8
	1964	526	464-587	87	64-109	16.5
361	1962	No Data				
	1963	436	280-591	138	67-209	31.6
	1964	177	141-213	30	17-43	16.7
D-3	1962	19325	18392-20259	4207	3742-4672	21.8
	1963	19919	18950-20887	3275	2898-3652	16.4
	1964	18201	17877-18525	4932	4772-5091	27.1

TABLE 2. DISTRICT THREE ELK HARVEST BY RESIDENTS AND NON-RESIDENTS, 1962-1964.

		Resident Harvest		Non-Resident Harvest	
Area	Year	Point	% Successful	Point	% Successful
30	1962	86	37.5	24	27.3
	1963	46	9.4	41	26.3
	1964	82	23.5	35	21.8
31	1962	258	20.0	86	33.3
	1963	273	15.7	108	27.7
	1964	245	17.6	148	28.7
32	1962	416	31.2	55	30.4
	1963	394	21.8	91	28.9
	1964	383	28.4	83	26.0
33	1962	1118	26.4	306	36.4
	1963	121	5.4	66	11.4
	1964	162	10.8	93	16.2
34	1962	143	26.3	8	33.3
	1963	30	8.7	0	0
	1964	23	10.1	1	7.7
35	1962	100	14.9	0	0
	1963	137	18.7	0	0
	1964	79	13.0	6	17.4
36	1962	43	9.1	16	18.2
	1963	152	26.3	66	32.0
	1964	77	21.3	77	34.9
37	1962	57	30.8	8	50.0
	1963	76	22.7	0	0
	1964	37	27.2	0	0
38	1962	57	11.1	16	50.0
	1963	121	13.3	8	11.1
	1964	183	22.5	31	34.4
39	1962	215	18.1	16	66.7
	1963	91	11.5	8	25.0
	1964	118	18.1	19	39.4
310	1962	172	16.7	63	30.8
	1963	197	19.7	124	30.0
	1964	697	51.9	59	26.7
311	1962	244	20.0	31	20.0
	1963	303	16.7	41	14.7
	1964	436	26.3	65	20.3
312	1962	143	22.7	8	12.5
	1963	76	12.2	0	0
	1964	64	17.7	6	12.9

TABLE 2-CONTINUED.

Area	Year	Resident Harvest Point	Resident Harvest % Successful	Non-Resident Harvest Point	Non-Resident Harvest % Successful
313	1962	57	7.8	0	0
	1963	76	20.8	0	0
	1964	984	66.5	41	42.4
314	1962	29	8.0	0	0
	1963	91	18.7	17	25.0
	1964	136	29.1	25	25.0
315	1962	Season Closed			
	1963	Season Closed			
	1964	Season Closed			
316	1962	29	11.1	8	11.1
	1963	76	29.4	25	18.7
	1964	56	19.3	43	23.6
317	1962	29	10.0	0	0
	1963	46	10.3	0	0
	1964	110	25.7	15	19.6
318	1962	129	20.4	0	0
	1963	137	18.0	0	0
	1964	116	19.2	1	7.1
319	1962	172	22.2	0	0
	1963	61	14.3	0	0
	1964	75	17.7	4	21.4
320	1962	43	11.1	24	20.0
	1963	30	6.7	8	20.0
	1964	79	16.9	7	12.8
361	1962	No Data			
	1963	121	30.8	17	40.0
	1964	19	15.0	10	21.2
D-3	1962	3542	20.8	666	28.5
	1963	2655	15.6	621	21.2
	1964	4162	27.7	770	24.3

TABLE 3. SEX AND AGE CLASSIFICATION OF DISTRICT THREE ELK HARVEST, 1962-1964.

Area	Year	Bull	Spike	Cow	Calf	Unknown
30	1962	81	29	0	0	0
	1963	87	0	0	0	0
	1964	83	30	0	0	4
31	1962	138	44	138	24	0
	1963	55	77	186	62	0
	1964	111	73	163	42	3
32	1962	153	73	180	65	0
	1963	193	32	183	77	0
	1964	161	66	162	69	8
33	1962	284	125	672	343	0
	1963	188	0	0	0	0
	1964	168	82	0	0	5
34	1962	29	43	80	0	0
	1963	30	0	0	0	0
	1964	19	6	0	0	0
35	1962	43	14	43	0	0
	1963	61	15	15	46	0
	1964	37	19	18	5	5
36	1962	29	14	16	0	0
	1963	77	32	94	15	0
	1964	56	29	46	22	0
37	1962	37	29	0	0	0
	1963	76	0	0	0	0
	1964	17	17	0	0	2
38	1962	44	14	14	0	0
	1963	130	0	0	0	0
	1964	51	34	107	19	2
39	1962	51	57	65	57	0
	1963	99	0	0	0	0
	1964	60	19	47	11	0
310	1962	110	30	59	37	0
	1963	157	62	55	8	39
	1964	136	92	377	142	10
311	1962	65	59	123	29	0
	1963	76	54	161	46	8
	1964	123	73	218	79	7
312	1962	8	43	57	43	0
	1963	76	0	0	0	0
	1964	38	30	1	0	0
313	1962	43	0	14	0	0
	1963	76	0	0	0	0
	1964	569	81	287	85	4

TABLE 3 - CONTINUED.

Area	Year	Bull	Spike	Cow	Calf	Unknown
314	1962	29	0	0	0	0
	1963	91	8	8	0	0
	1964	113	34	12	0	1
315	1962	Closed Season				
	1963	Closed Season				
	1964	Closed Season				
316	1962	14	0	22	0	0
	1963	84	0	17	0	0
	1964	66	13	15	5	0
317	1962	14	0	0	14	0
	1963	30	0	15	0	0
	1964	71	18	25	12	0
318	1962	86	29	14	0	0
	1963	46	30	46	15	0
	1964	38	35	29	15	0
319	1962	115	14	29	14	0
	1963	61	0	0	0	0
	1964	65	13	0	0	1
320	1962	51	8	8	0	0
	1963	39	0	0	0	0
	1964	52	34	0	0	0
361	1962	No Data				
	1963	46	15	32	46	0
	1964	10	1	12	7	0
D-3	1962	1422	626	1533	626	0
	1963	1776	325	812	314	47
	1964	2043	801	1521	513	53

the harvests for 1962, to 1964 was 33%, 54% and 42% respectively.

Twenty-four hour checking stations have been operated in connection with the elk season in Area 310 (Upper Gallatin) for a number of years. Harvest information collected at these stations during the 1962 and 1963 seasons is presented in Tables 4 and 5. Tables 6 and 7 contains information collected at these stations during the 1964 season. This station has variously been located or called the Squaw Creek Station, Spanish Creek Station or Lower Gallatin Station. Most of the elk harvested in the Gallatin are checked through this station, therefore, there is considerable merit in comparing year to year data obtained at this station. A more detailed consideration of the Upper Gallatin elk is presented in the Job B-10 Completion reports under project W-98-R.

Some degree of public discussion has occurred regarding the operation of the checking stations attending the Gallatin elk seasons. The lower Gallatin checking station (at its various locations) has usually been operated on a twenty-four hour basis for many years. The operation of this station as well as many others in various

TABLE 4. GALLATIN ELK CHECKING STATION DATA, 1962 REGULAR SEASON. (GRAYLING AND SPANISH CREEK STATIONS)

Harvest							
By Age and Sex		By Time		By Drainage		Origin of Succ. Hunter	
Bull	19	9/16-22	19	Taylor Fork (+Wapiti)	11	Gallatin Co.	18
Cow	11	9/23-29	5	Sage Creek	9	Other Counties	18
Ylg Cow	3	9/30-10/6	2	West Fork Area	8	Non-Resident	11
Spike	13	10/7-13	2	Snowslide	4		
Calf	1	10/14-20	5	Bacon Rind	4		
		10/21-27	13	Spanish Creek	4		
Total	47	10/28-11/4	1	Portal Creek	3		
				Swan Creek	2		
				Buffalo Horn Creek	1		
				Cinnamon Creek	1		
				Total Area 310	30		
				Total Area 311	17		

TABLE 5. GALLATIN ELK CHECKING STATION DATA, 1963 REGULAR SEASON. (SPANISH CREEK, QUAKE LAKE, GRAYLING CREEK)

Harvest	Elk	83
Drainage of Harvest:	Gallatin Drainage	56
	Madison Drainage	27

TABLE 6. GALLATIN ELK CHECKING STATION DATA, 1964 REGULAR SEASON. (LOWER GALLATIN, WEST YELLOWSTONE, AND QUAKE LAKE)

		Male				Female				
Area	Drainage	Ad.	Yrlg.	C.	Unk.	Ad.	Yrlg.	C.	Unk.	Total
310	Wapiti Creek		3	2		2				7
	Buffalo Horn	1	2	1		2		1		7
	Buck Creek	8	1	2	1	8		1		21
	Tepee Creek	3		2	1	3				9
	Beaver Creek	4	1	2	1	6		3		17
	Sage Creek	10		1		5				16
	Lightning Creek					2				2
	Red Canyon	1								1
	Cinnamon Creek					1				1
	Alp Creek	1								1
	Sentinel					1				1
	Taylor Fork	4		2		5				11
	Cabin Creek	1	4							5
	Porcupine Creek	3				2				5
	Wickiup Creek					1				1
	Twin Creek					2				2
	Doe Creek			1		2				3
	Cub Creek	1								1
	Unknown	2			1	1				4
	Total Area 310	39	11	13	4	43	0	5	0	115
31		1								1
33		3				1				4
36						1				1
361		1				2				3
	Total Other Areas	5	0	0	0	4	0	0	0	9

TABLE 7. GALLATIN ELK CHECKING STATION DATA, 1964 REGULAR SEASON. (LOWER GALLATIN STATION ONLY)

Area	Drainage	Male				Female				Total
		Ad.	Y.	C.	Unk.	Ad.	Y.	C.	Unk.	
311	Cherry Creek	3	2	2		6		2		15
	Spanish Creek	8				13		3		24
	Squaw Creek	4	1			1		1		7
	Swan Creek	2	2			3			1	8
	Moose Creek	2		1		7				10
	Logger Creek					2				2
	Dudley Creek	1	2							3
	Portal Creek					3	1			4
	Behive Basin			1		1				2
	W. Fork Gallatin	7		1		10		4		22
	Yellow Mule	3	2			3				8
	Michener Creek					2				2
	Muddy Creek	3				2				5
	Beaver Creek	6		2		6		1	1	16
	Unknown			1		5				6
	Total Area 311	39	9	8	0	64	1	10	2	133
33		1								1
314						1				1
361		3		2		5				10
36		5				2				7
	Total Other Areas	9	0	2	0	8	0	0	0	19

parts of the state has led the department to conclude that generally speaking most checking stations could be closed down during the late evening and early morning hours as well as during the middle of the week. Tables 8 through 12 indicate such a conclusion is valid concerning time of day most hunters check through the stations operated for the regular Gallatin elk season.

Checking stations were also operated for special elk seasons held in the Gardiner Area in 1963 and 1965, and in the Gallatin Canyon area during December-January of 1964-65. Tables 13 and 14 present information collected during the 1963 Gardiner seasons. Other information pertinent to those seasons is contained in the appendix. The 1963 Special Gardiner season was operated on a special permit basis for the first two days of the season, (January 26 and 27). After the first two days no special permit was required. Of the 801 permits issued, 507 of these hunters were checked the first two days of the season. A mail questionnaire survey was made of the 801 people receiving the permit. The results of this survey is presented in Table 15.

The February 1965 special elk season held in the Gardiner area was operated much like that of 1963. In the case of both the 1963 and 1965 special elk seasons, the closing date was earlier than legal notices indicated. The earlier closing date was a result of the desired harvest being attained before the allotted time, and the 48 hour closing notice was exercised. Tables 16 and 17 list information collected during the 1965 Special Gardiner elk season.

TABLE 8. TIME OF ARRIVAL OF HUNTERS AT THE LOWER GALLATIN CHECKING STATION, REGULAR SEASON, 1962.

TIME	SUCCESSFUL HUNTERS	UNSUCCESSFUL HUNTERS	ELK	MULE DEER	MOOSE	BEAR	SHEEP
12-1 p.m.	2	92	1	1			
1-2	7	120	3	1	3		
2-3	11	133		10		1	
3-4	11	73	3	8			
4-5	15	160	6	6	2		
5-6	11	127	3	3	6		
6-7	4	89		4			
7-8	5	78	1	4			
8-9	2	10		1	1		
9-10	1	13			1		
10-11							
11-12							
12-1 a.m.							
1-2							
2-3							
3-4							
4-5							
5-6							
6-7							
7-8		8					
8-9	7	18	2	4	1		
9-10	12	93	5	6	1		
10-11	16	125	2	11	3		
11-12	7	68	1	6			
Total	111	1207	27	65	18	1	0
No Time	96	800	41	33	18	2	4
Total	207	2007	68	98	36	3	4

TABLE 9. TIME OF ARRIVAL OF HUNTERS AT THE QUAKE LAKE CHECKING STATION, REGULAR SEASON, 1963.

TIME	SUCCESSFUL HUNTERS	UNSUCCESSFUL HUNTERS	ELK	MULE DEER	MOOSE	BEAR	SHEEP
12-1 p.m.		12					
1-2		16					
2-3	1	19		2			
3-4		21					
4-5	1	24			1		
5-6	1	24		1			
6-7		10					
7-8		5					
8-9		7					
9-10		6					
10-11							
11-12		3					
12-1 a.m.							
1-2							
2-3		2					
3-4							
4-5		6					
5-6							
6-7		15					

TABLE 9 - CONTINUED.

TIME	SUCCESSFUL HUNTERS	UNSUCCESSFUL HUNTERS	ELK	MULE DEER	MOOSE	BEAR	SHEEP
7-8	1	21	1				
8-9		2					
9-10	4	38	2	3			
10-11		50					
11-12		13					
Total	8	294	3	6	1	0	0
No Time	11	2	2	11	1	0	0
Total	19	296	5	17	2	0	0

TABLE 10. TIME OF ARRIVAL OF HUNTERS AT THE WEST YELLOWSTONE CHECKING STATION, REGULAR SEASON, 1963.

TIME	SUCCESSFUL HUNTERS	UNSUCCESSFUL HUNTERS	ELK	MULE DEER	MOOSE	BEAR	SHEEP
12-1 p.m.	10	13	6	3		1	
1-2	24	17	9	28			
2-3	16	27		8	3		
3-4	7	13	3	7			
4-5	23	16	4	19	1		
5-6	10	13	5	5			
6-7	8	10		11	1		
7-8	5	9	1	3			
8-9	4	4		3	1		
9-10	4	2	1	3			
10-11	2		2				
11-12							
12-1 a.m.							
1-2							
2-3							
3-4	2			2			
5-6		10					
6-7		21					
7-8		44					
8-9	9	33	3	8			
9-10	1	18		1			
10-11	6	16	2	3			
11-12	7	9	3	4			
Total	138	275	39	108	6	1	0
No Time	36	4	14	35	3	0	0
Total	174	279	53	143	9	1	0

TABLE 11. TIME OF ARRIVAL OF HUNTERS AT THE LOWER GALLATIN CHECKING STATION, REGULAR SEASON, 1963.

TIME	SUCCESSFUL HUNTERS	UNSUCCESSFUL HUNTERS	ELK	MULE DEER	MOOSE	BEAR	SHEEP
12-1 p.m.	9	38	3	5	1		
1-2	10	55		5	3		1
2-3	9	72	2	4	3		
3-4	15	49	6	5	2	1	1
4-5	24	68	12	8	4		1
5-6	12	38	4	6	2		
6-7	17	119	7	8	2		
7-8	16	50	4	12	1		
8-9	12	10	4	5	3		
9-10	12	2	7	2	2		2
10-11	1	6	1				
11-12	2	4	2				
12-1 a.m.	2		1		1		
1-2		2					
2-3							
3-4							
4-5							
5-6							
6-7		2					
7-8	4	2		4			
8-9	12	40	1	6	1		
9-10	11	10	3	8	2		
10-11	11	37	7	6			1
11-12	6	24	2	4			
Total	185	628	66	88	27	1	6
No Time	103	35	39	58	9	1	2
Total	288	663	105	146	36	2	8

TABLE 12. TIME OF ARRIVAL OF HUNTERS AT THE QUAKE LAKE, WEST YELLOWSTONE AND LOWER GALLATIN CHECKING STATIONS, REGULAR SEASON, 1963.

TIME	SUCCESSFUL HUNTERS	UNSUCCESSFUL HUNTERS	ELK	MULE DEER	MOOSE	BEAR	SHEEP
12-1 p.m.	19	63	9	8	1	1	
1-2	34	88	9	33	3		1
2-3	26	118	2	14	6		
3-4	22	83	9	12	2	1	1
4-5	48	108	16	27	6		1
5-6	23	75	9	12	2		
6-7	25	139	7	19	3		
7-8	21	64	5	15	1		
8-9	16	21	4	8	4		
9-10	16	10	8	5	2		2
10-11	3	6	3				
11-12	2	7	2				
12-1 a.m.	2		1		1		
1-2		2					
2-3		2					
3-4	2			2			
4-5		6					
5-6		10					

TABLE 12-CONTINUED.

TIME	SUCCESSFUL HUNTERS	UNSUCCESSFUL HUNTERS	ELK	MULE DEER	MOOSE	BEAR	SHEEP
6-7		38					
7-8	5	67	1	4			
8-9	21	75	4	14	1		
9-10	16	66	5	12	2		
10-11	17	103	9	9			1
11-12	13	46	5	8			
Total	331	1197	108	202	34	2	6
No Time	150	41	55	104	13	1	2
Total	481	1238	163	306	47	3	8

TABLE 13. GARDINER SPECIAL ELK SEASON, 1963 CHECKING STATION DATA.

	Harvest*	Unsuccessful Hunters	Total Hunters	Percent Success
Mature Male	229			
Spikes	45			
Calf Male	25			
Mature Female	149			
Calf Female	22			
Calf Unknown	1			
Total	471	634	1105	43.0

* (All yearling males identified, no attempt to identify yearling females).

TABLE 14. GARDINER SPECIAL ELK SEASON, DAILY HARVEST, 1963.

Date		Elk Checked	Cumulative Total
Saturday, January	26	162	162
	27	89	251
	28	34	285
	29	30	315
	30	33	348
	31	19	367
Friday, February	1	21	388
	2	40	428
	3*	38	466
	4	5	471
			+4 Known killed but not checked at station.
			475

*Season closed on this date.

TABLE 15. GARDINER SPECIAL ELK SEASON, 1963, QUESTIONNAIRE DATA.

1. 95% mail survey (not all addresses were complete).
2. 801 permits issued; 629 returns; 78% response.
3. The estimated results were:
   a. 656 hunted out of the 801 that had permits.
   b. Of those that hunted, 330 killed an elk for a success of 50%.
   c. 161 of those killed were bulls.
   d. 125 of those killed were cows.
   e. 44 of those killed were calves.

This survey covers only those hunting this post season on special permits. Hunting after the first weekend was open to anyone with a valid elk tag.

TABLE 16. GARDINER SPECIAL ELK SEASON, 1965 CHECKING STATION DATA. (FEBRUARY 6 TO FEBRUARY 13).

METHOD OR PLACE	ELK	
Checked at Checking Station	759	
Checked by Wardens(below station)	109	
Confiscated	11	
Left dead in Area	35	
Gardiner-Jardine residents[1]	61	
Mammoth[1]	0	
Total	975	
Illegal	7	
Regular Season	30+	
Successful Hunters	759	
Unsuccessful hunters	821	
Total Hunters[2]	1580	(48% Success)

[1] Elk taken by residents of these towns and not checked through station.

[2] Checked through station.

TABLE 17. GARDINER SPECIAL ELK SEASON, 1965 SEX AND AGE DATA.[1]

SEX AND/OR AGE	NUMBER
Cows	280
Calves	82
Spikes	47
Bulls	448
Total	857

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[1] The sex and age of 857 elk out of the total known kill of 975 was verified.

On December 27, 1964 a special elk season was opened in the Upper Gallatin (Area 310). Harvest data obtained during this season is presented in Table 18. Other aspects of this special season are incorporated into the Job B-10, W-98-R completion report. Some information on weights and body condition of elk harvested during this season is presented in W-83-R completion report. The manner in which the season was conducted can be found in the appendix. A short resume' of the harvest tabulated from checking station results appears in Table 19 and Table 20 presents total losses in the Gallatin during the winter of 1964-65.

During the first three days (October 18, 19, 20) of the general 1964 big game season, checking stations were operated in Area 38 (Radersburg). Table 21 presents the data collected from the five stations operated during the season. Based on 876 hunters checked, the elk hunter success was calculated at 8.7%.

Elk Populations

Table 22 summarizes elk population information collected in District Three, 1960-1965. Flights were often made to ascertain general distribution with no attempt to count all animals, therefore, the information should not be construed to represent total numbers of elk.

Several cooperative elk surveys have been made in the Upper Gallatin with representatives from Sportsmen's Clubs, the U.S. Forest Service, the National Park Service, the Press and the Montana Fish and Game Department participating. The results of the surveys are reported in Job Completion Report W-98-R-5.

Table 23 is a summary of information collected during cooperative surveys of the Northern Yellowstone elk herd in 1956, 1961, 1962, and 1965. Two helicopters were used during the survey on April 6, 7 and 8, 1965. Weather conditions during the flights were poor. The totals generally reflect varying snow conditions for the different years.

Limited information has been collected on elk herd composition in Areas 33 and 36. On January 4, 1963 the calf:cow ratio in Area 33 was 57:100; the sex ratio was 19M:100F; 414 animals were classified. On the same date, 151 animals were classified in Area 36. The calf:cow ratio was 41:100 and the sex ratio was 38:100. On September 16, 1963, ninety-four elk were classified in Area 33. The calf:cow ratio was 43:100; the sex ratio was 61:100.

On May 21, 1965, twenty-eight dead elk, (15 cows, 9 calves and 4 unclassified) were seen along Duck Creek north of West Yellowstone within 1½ miles of a feed ground. The feed ground herd was estimated at about 200 head. Winter mortality amounted to from 10% to 15% of the herd, in spite of the fact that hay was readily available from February 12 to about April 30, 1965. The bulk of the mortality occurred after April 1, 1965.

Some attempt has been made to evaluate cattle use and distribution patterns adjacent to the Wall Creek Game Range, as it may affect elk. Observations of cattle distribution on these areas is shown on Table 24.

Range

This and future reports will be divided into three major divisions (i.e., harvest, populations and habitat or range). As far as is possible this arrangement will be followed. Some of the data on hand is so organized as to preclude such a division. The following material in the interest of saving time and preserving the continuity of thought established in the data, will be presented in the form it was written.

TABLE 18. SPECIAL UPPER GALLATIN ELK SEASON, DECEMBER 1964 - JANUARY 1965.

Time Period	Area	Permits Issued	Validated	Harvest		Total
				Legal	Illegal	
1	2	102	75 = 75	40 = 40	0	40
2	1		43	31	2	
	2	226	122 = 183	66 = 110	0 = 4	114
	3		18	13	2	
3	1		113	93	1	
	2	226	19 = 185	11 = 138	0 = 1	139
	3		53	34	0	
4	1		87	59	0	
	2	227	17 = 180	12 = 102	0 = 6	108
	3		76	31	6	
5	1		91	40	3	
	2	220	28 = 183	14 = 89	1 = 4	93
	3		64	35	0	
6	1		51	16	0	
	2	200	55 = 149	22 = 55	0 = 0	55
	3		43	17	0	
7	1		67	22	0	
	2	201	57 = 155	16 = 48	2 = 2	50
	3		31	10	0	
8	1		67	29	3	
	2	200	43 = 137	15 = 54	4 = 7	61
	3		27	10	0	
9	1		58	27	0	
	2	200	50 = 136	19 = 53	7 = 9	62
	3		28	7	2	
10	1		71	14	1	
	2	205	42 = 130	13 = 30	0 = 1	31
	3		17	3	0	
TOTAL	1		648	331	10	341
	2		508	228	17*	245
	3		357	160	10	170 1/
TOTAL	All	2007	1513	719	37	756

* Includes 3 in Yellowstone National Park.

1/ About 50% success.

TABLE 19. GALLATIN ELK HARVEST, 1964.

Area	Season Dates	Harvest Composition			
		Males	Females	Calves	Total
311 (Lower Gallatin)	10/18 - 11/22	52	61	16	129
310 (Upper Gallatin)	10/18 - 11/1	33	31	10	74*
310 (Upper Gallatin)	12/27 - 1/31 (1964-1965)	197	370	183	750**

* Gallatin drainage portion of 310 only.

** Four not classified.

TABLE 20. GALLATIN ELK-TOTAL REDUCTION ALL CAUSES - WINTER 1964-1965.

Harvest (legal and illegal)	756
Carcasses in field after Special Season	41
Winter starvation loss	36
Highway fatalities	4
Total	837

TABLE 21. RADERSBURG (CROW CREEK) ELK HARVEST - 1964.

	Male			Female			
Station	Ad.	Calf	Unk.	Ad.	Calf.	Unk.	Total
Prickly Pear	1	0	2	7	0	0	10
Winston	1	0	0	3	1	0	5
Indian Creek	10	1	1	7	1	1	21
Radersburg	3	2	0	8	2	0	15
Johnny Gulch	1	2	0	7	0	0	10
Total	16	5	3	32	4	1	61

TABLE 22. DISTRICT THREE ELK SURVEY INFORMATION, 1960 - 1965.

			Number Observed		
Area	Date	Location	By Drainage	Area Total	Remarks
30	2/3/61	Lima Hills	119		
	2/9/61	Lima Hills	145	264	
	1/17/62	-		156	
	2/22/63	Little Sheep Creek	126		Aerial Obs.
	2/22/63	Two Springs Gulch	13		Aerial Obs.
	4/20/63	Muddy Creek	27	166	
	1/19/63	Two Springs Gulch		12	
	2/2/63	Two Springs Gulch	11		
	2/20/63	Head of Muddy	21		
	2/22/63	Div. Little Sheep-Sawmill	63		Aerial Obs.
	2/22/63	Middle Fork Little Sheep	63		Aerial Obs.
	2/22/63	Two Springs Gulch	13	171	Aerial Obs.
	3/5/63	Head of Muddy	21		
	3/6/63	Two Springs Gulch	1		
	3/14/63	Middle Fork Little Sheep	74	96	
	4/17/63	Johnson Creek (Muddy)	11		
	4/20/63	Johnson Creek (Muddy)	27	38	
	5/9/63	Little Sheep	4		
	5/24/63	Muddy Creek	12	16	
	1/29/64			155	Morn. Aerial obs. Ltl. snow cvr.
	2/19/65	Deep Creek	22		Clr., good snow cvr and good obs. conditions.
	2/19/65	Little Sheep Creek	105		
	2/19/65	Straight Creek	8	135	

TABLE 22 - CONTINUED.

Area	Date	Location	Number Observed By Drainage	 Area Total	Remarks
31	2/11/63	Scudder Creek	3		
	2/15/63	Canyon Creek	103		
	2/31/63	Horse Prairie	125	231	
	1/27/64	Devil's Hole	89		Late morning.
	1/27/64	Cattle Gulch	20		
	2/1/64	Horse Prairie	151	260	A.M. Flt.-lt. snow cvr.
	2/6/65	Horse Prairie	188		A.M. Flt.-lt. snow cvr.
	3/20/65	Canyon Creek	186	374	A.M. Flt.-good condit.
32	12/14/61	Big Hole Basin from Steel Cr. to Fishtrap Schlhse.	172		
	2/13/62	"	182		
	1/28/64	"	182		Favorable conditions.
	3/10/64	"	72	1096	Helicptr. Flt-Condi. not gd.
	2/7/65	"	270)		Aerial obs.-excel.
	2/7/65	Carroll Hill	81)		
	2/7/65	Butch Hill	69)		
	2/7/65	Huntley's Ranch	68)	488	
	3/20/65	Big Hole Basin from Steel Cr. to Fishtrap School	196		Unfav. condi. Mst animals were obs. in or near tmbr.
		Butch Hill	53		
		Sheep Creek	40		
		Warm Springs Cr.	22	311	
33	1/9/62	Wall Creek	140		Seen about noon. Snow cvr good.
		Ruby Creek	38		
		Cherry Creek	26	204	
	1961-62	Blacktail Creek	550		Highest ct for ea. drnage, during wntr 1961-62.
		Lower Ruby Creek	175		
		Ledford Creek	175		
		West Side Madison	330		
		Centennial	225	1455	
	1/21/63	Bobcat & English George Cr.	6		
	1/23/63	Wigwam Creek	2		
		Cherry Creek	19		
		Johnny Gulch	3		
		Wall Creek	11		
		Bobcat Creek	11		
		English George Creek	47		
		Cliff Lake	6		) West Fork Madison
		Meridian Creek	5		)
		Landon Ridge	24		
		Snowshoe Creek	8		)
		Metzel Creek	37		)
		Tepee Creek	43		) Centennial
		Sand Hills	25		)
		Elk Lake	6	253	

TABLE 22 - CONTINUED.

Area	Date	Location	Number Observed By Drainage	 Area Total	Remarks
33	1/26/63	Barton Gulch	2		
		Powder Gulch	23		
		Warm Springs Creek	14		
		Cottonwood Creek	24		
		Ruby Creek	16		
		Beaver Creek	16		
		Ledford Creek	48		
		E. Fork Blacktail	52		
		M. Fork Blacktail	5		
		Wolverine Creek	2		
		Peterson Basin	36		
		Gazelle Creek	6		)
		Tepee Creek	10		)
		Buford Creek	3		) West Fork Madison
		Fossil Creek	7		)
		Horn Creek	12	276	
	2/6/63	Barton Gulch	33		Ground Obs.
	2/7/63	Wall Creek	25		Ground Obs.
	2/25/63	Bobcat Creek	140		Aerial obs.
		English George Cr.	34		
		Elk River	7		
		Gazelle Creek	14	253	
	3/13/63	Johnny Ridge	5		
		Hyde Creek	25		
		English George Creek	73		
		Hyde Creek-Dry Hollow	38		
		Dry Hollow	9		
		Gazelle Creek	9		
		Elk River	8		
		Murphy-Centennial Creeks	150		Approx. Count.
		Rough Creek	57		)East Fork Blacktail
		Hogback	3		)
		Ledford	54		
		Clark's Canyon	48	479	
	3/18/63	Wigwam Creek	10		Light snow.
		Morgan Creek	11		
		Cherry Creek	16		
		Wall Creek	176		
		Horse Creek	13		
		Mouth W. Fork Madison	13		
		Mouth Elk River	8		
		M. Fork Warm Springs	30		
		Cottonwood Creek	59		
		Burnt Creek	9		
		Patchtop Mountain	150		
		Landon Station	8	503	
	1/24/64	Fertilizer plots	111		Mad.-Wall Cr. G.R. Grd obs.
		English George Cr.	49		
		S. of English George	28		
		Wall Cr. Ranger Sta.	23		
		Buck's Nest	7		
		South Dry Hollow	18		
		Dry Hollow	22	258	

TABLE 22 - CONTINUED.

Area	Date	Location	Number Observed By Drainage	 Area Total	Remarks
33	2/18/64	Sunrise Gulch	8		
		Cherry Gulch	26		
		Johnny Gulch	6		
		Dry Hollow	192		
		Wall Creek	64		
		Horse Creek	36		
		Standard Creek	9	341	
	3/31/64	Morgan Gulch	26		
		Johnny Gulch	7		
		Dry Hollow	273		
		Horse Creek	27		
		Standard Creek	7	340	
	2/1/64	Dry Hollow-Ruby Cr. Ridge	192		252 Tl on Mad.-Wall Cr.G.R.
		Wall Cr. Ranger Sta.	60		
		Kelly Ranch	39		
		Wall Creek (head)	2		
		Horse Creek	4		
		Standard Creek	5		
		Johnny Gulch	6		
		Cherry Gulch	25		
		Sunrise Gulch	8	341	
	2/25/64	Ledford Creek	91		Frsh Snow, lt. overcast.
		E. Fork Blacktail	37		Lt. not good.
		M. Fork Blacktail	71		
		W. Fork Blacktail	100		
		E. Fork Clover Creek	31		
		Long Creek	98		
		Lazy Man Creek	6		
		S. Fork Warm Spring	70		
		S. Fork Green Horn Cr.	17		
		Idaho Creek	4		
		Willow Creek	19	544	
	3/16/64	Clark Canyon	34		Weather Unfav. for obs.
		Clark Canyon-South Rim	7		
		Jake Canyon	6	47	
	3/31/64	Morgan Gulch	26		West side of Mad. R.
		Johnny Gulch	7		
		Dry Hollow	273		
		Horse Creek	27		
		Standard Creek	7		
		Patchtop	7	347	
	1/8/65	Mad.-Wall Cr. G.R.	149		Grnd obs. near bldgs.
		Mad.-Wall Cr. G.R.	106		Near check plots.
		English George Cr.	26	281	

TABLE 22 - CONTINUED.

Area	Date	Location	Number Observed		Remarks
			By Drainage	Area Total	
33	4/1/65	Axolotl Lake	6		Mod-Severe turb.
		Wigwam Creek	4		Scat.-Hvy ovrcast.
		Morgan Gulch	6		Scat snw on intermed. slps.
		Cherry Creek	49		
		Johnny Ridge	2		
		Ruby Creek	29		
		Dry Hollow	9		
		Hyde Creek	189		
		Mad.-Wall Cr. G.R.	14		W. Fert. plots.
		English George Creek	25		
		Bobcat Creek	2	335	
	4/6/65	Cream Creek	2		Ptly cloudy, windy.
		Ledford Creek	82		Snw cvr intermittent.
		Snow slide Creek	24		
		E. Fork Blacktail	65		Two Meadow Creek
		Alkali Creek	76		
		W. Fork Blacktail	135		
		Long Creek	3	387	Pole Creek
	4/3/65	Barton-Davey Creek	74		Ptly cldy 30 mph.
		S. Fork Warm Springs	33	107	Wind, scat. snw cvr.
	4/13/65	Willow Creek	38		
		S. Fork Warm Springs	24		
		Short Creek	8		
		Burnt Creek	2		
		Cream Creek	2		
		Spring Creek	6		
		Lone Rock Creek	2		
		Ledford Creek	39		
		Robb Creek	70	191	
34	4/13/65	Hell's Canyon	27		Poor conditions.
		Moose Creek	17	44	
36	3/24/60	Wall Creek Flats	46		Ground obs.
		Jack Creek	151	197	
	2/6/61	Cedar Creek	39		Poor lt, poor snw.
		Bear Creek	50		
		Indian Creek	12		
		Wolf Creek	58		
		Bad Luck Creek	14		
		Squaw Creek	24	197	
	1/9/62	Jack Creek	4		
		Yeckel's Ranch	47		
		Cedar Creek	15		
		Bear Creek	153		
		Indian Creek	34		
		Wolf Creek	115		
		Moose Creek	9		
		Squaw Creek	9	386	

TABLE 22 - CONTINUED.

Area	Date	Location	Number Observed By Drainage	Number Observed Area Total	Remarks
36	1/19/63	Bear Creek G. R.	47		Grnd. obs from road.
	1/20/63	Bear Creek G. R.	83		Grnd obs.
		Bear Cr. S. - Hebgen L.	81		Grnd obs.
	1/26/63	Bear Creek G. R.	82		Grnd obs.
	1/27/63	Bear Creek G. R.	69		Grnd obs.
	2/4/64	Shell Creek divide	45		
		Bear Creek G. R.	254		
		Indian Creek	8		
		Corral Creek divide	48		
		Wolf Creek divide	54		
		Bad Luck Creek	17		
		Moose Creek	13		
		Squaw Creek	10		
		Squaw Creek divide	16		
		Papoose Creek	6		
		Trout Creek	9		
		Reynold's Pass	20	500	
	3/30/64	Cedar Creek	61		
		Boulder Creek	7		
		Shell Creek	86		
		Tollman Creek	91		
		Burger Creek	28		
		Bear Creek	180		
		Indian Creek	50		
		Wolf Creek	106		
		Moose Creek	9		
		Squaw Creek	16		
		Papoose Creek	4		
		Trout Creek	2		
		Reynold's Pass	20	660	
	3/30/64	Jack Creek	10		
		Cedar Creek	19		
		Shell Creek	32		
		Tollman Creek	51		
		Mill Creek	42		
		Bear Creek G. R.	165		
		Indian Creek	55		
		Corral Creek	47		
		Armitage Ranch	32		
		Wolf Creek	90		
		Bad Luck Creek	9		
		Squaw Creek	6		
		Papoose Creek	16		
		Mile Creek	16	590	

TABLE 22 - CONTINUED.

			Number Observed		
Area	Date	Location	By Drainage	Area Total	Remarks
36	3/13/65	Cedar Creek	8		Frsh snw, clr, lt. wind good conditions.
		Shell Creek	17		
		Tollman-Mill Creek	67		
		Bear Creek G. R.	385		1 spk., butterfly-yllow, red, wht, grn.- 1 ♀ yllw.
		Trail Fork of Bear Cr.	173		1 spk., butterfly-yllow, red, wht, - 1 ♀ bttrfly-wht.
		Indian Creek	62		
		Corral Creek	2		
		Deer Creek	20		
		Deer Creek-Wolf Creek	127		
		Wolf Creek	21		
		Moose Creek	1		
		Squaw Creek	45		
		Sheep Creek	3		
		Mile Creek	10		
		Reynold's Pass	3	944	
37	1/11/62	Hadley Park	74		Wind - poor counting.
		Mullevy Creek	19		
		S. Bull Mountain	3		
		Whitetail Creek	39		
		Potter Creek	17		
		W. Bull Mountain	16	168	
	3/16/64	East-Centr. portion	7		Wind-poor counting.
		Bill Sweet Cabin	52		
		Hadley Park	26		
		Whitetail Creek	74	159	
	3/8/65	Swampy Park	50		Snw lt. and patchy.
		Mullevy Creek	9		
		Jack Creek	6	65	
38	3/20/61	Slim Sam Creek	2		Early morn. flt.
		S. Fork Crow Creek	54		
		Jenkins Gulch Road	26		
		Jenkins Gulch	210		
		Eagle Creek	47		
		Longfellow Park	9	348	
	1/16/63	Slim Sam Creek	59		Snw cvr near complete.
		Jenkins Gulch	38		
		Eagle Creek	13	110	
	1/10/63	Sagebrush Creek	82		Eveng. flt., good light, air and snw cvr.
		Slim Sam Creek	182		
		Keating Gulch	20	284	
	3/8/63	Eagle Station	18		Bare grnd. over much of area.
		Slim Sam Creek	47		
		Jenkins Gulch	225	290	
	1/8/65	Jenkins Gulch	58		Snw cvr - lt. condi. poor.
		Eagle Station	121		
		N. of Eagle Station	15	194	

TABLE 22 - CONTINUED.

Area	Date	Location	Number Observed By Drainage	Area Total	Remarks
38	2/3/65	Slim Sam Creek	121		Condi. not the best.
		Big Mountain	39		
		Hog Hollow	11		
		Jenkins Ridge	53		
		Muddy Lake Ridge	8		
		Cold Springs	24		
		Eagle Creek	37	293	
39	3/21/61	Dry Creek	14		Poor snw condi.
		Deep Creek	27		
		Six Mile Creek	25	66	
	1/8/62	Dry Creek	71		Eveng. flt -good condi.
	1/11/62	Deep Creek	4		Not a good count.
310-311	1/7/60	Sage Creek	5		
		Taylor Fork	363		
		Tepee Creek	622		
		Daly Creek	180		
		Sawmill Creek	17		
		Monument-Black Butte Cr.	152		
		Patton Ranch	78		
		Sunshine Creek	22		
		Buffalo Horn Creek	42		
		Elkhorn Creek	49		
		Porcupine Creek	158		
		Beaver Creek	22	1710	
	12/3/60	Elkhorn Creek	80		
		Buffalo Horn Creek	58		
		Tepee Creek	461		
		Daly Creek	201		
		Specimen Creek	8		
		Lodgepole Creek	69		
		Sawmill Creek	115		
		Sage Creek	10		Fog.
		Wapiti Creek	28		
		Taylor's Fork	16		
		Shedhorn Mountain	2		
				1048	
	12/29/60	320 Ranch	14		
		Lodgepole-Sawmill	408		
		Lodgepole Creek	14		
		Patton Ranch	3		
		Monument Creek	22		
		Sage Creek	17		
		Black Butte Creek	58		
		Wilson Creek	17		
		Daly Creek	252		
		Grouse Mountain	6		
		Tepee Creek	246		
		Buffalo Horn	48		
		Elkhorn	88		
		Porcupine Creek	193		
		Wapiti Creek	100	1486	

TABLE 22 - CONTINUED.

Area	Date	Location	Number Observed By Drainage	Number Observed Area Total	Remarks
310-311	3/6/61	Cherry Creek	68		Poor snw- poor lt.
		S. W. Elk Mountain	65		
		W. Fork Spanish Creek	5		
		N. Spanish Creek	5		
		N. Fork Spanish Creek	3	146	
	3/22/61	Porcupine Creek	252		
		Buck Creek	25		
		Buffalo Horn Creek	46		
		Meadow Creek	311		
		Cooke Creek	22		
		Wapiti Creek	50		
		Mouth of Sage Creek	25		
		Tepee Creek	67		
		Daly Creek	210		
		Sawmill Creek	171		
		Patton Ranch	10		
		Black Butte Creek	2		
		Specimen Creek	8		
		Duck Creek	127		
		Cougar Creek	38	1364	
	11/28/61	Tepee Creek	253		Aerial chk. on distrib.
		Crown Butte	88		
		Lodgepole-Sawmill	160		
		Monument Creek	6		
		Black Butte	41		
		Daly Creek	96		
		Buffalo Horn	33		
		Elkhorn Creek	7		
		Porcupine Creek	35		
		Taylor's Fork	186	905	
	1/3/62	Taylor's Fork	176		Good snw cvr, wind blwg hard, got only an idea of distrib.
		Meadow Creek	142		
		Slide Creek	40		
		Wapiti Creek	41		
		Snow Flake Springs	4		
		Sawmill Creek	7		
		Crown Butte	24		
		Tepee Creek	130		
		Buffalo Horn Creek	42		
		Elkhorn Creek	1		
		S. Porcupine Creek	58		
		N. Porcupine Creek	346	1011	
	1/16/62	Beaver Creek	21		Two planes used. Good snw covr and obs. condi. This was a good count.
		Cinnamon Creek	14		
		320 Ranch	22		
		Taylor's Fork	158		
		Wapiti Creek	5		
		Slide Creek	24		
		Meadow Creek	250		
		Sage Creek	30	524	

TABLE 22 - CONTINUED.

Area	Date	Location	Number Observed By Drainage	Number Observed Area Total	Remarks
310-311	1/16/62	N. Porcupine Creek	421		
		S. Porcupine Creek	48		
		Elkhorn Creek	10		
		Buffalo Horn Creek	91		
		Tepee Creek	214		
		Lodgepole-Sawmill	82		
		Black Butte Creek	3		
		Daly Creek	37	906	
	2/27/62	Elk Mountain	59		
		Pole Creek	166		
		Spanish Creek	39	264	
	3/18/63	Elk Mountain	47		Poor snw cvr.
		Pole Creek	67		
		Spanish Creek	91	205	
	3/31/64	Elk Mountain	48		15% thin ovrcast, slight wind, snw cvr patchy. Condi. for obs. were less than good.
		Elk Mountain Ridge	60		
		N. Fork Spanish Creek	47		
		Dudley-Deer Cr. divide	18	173	
	4/4/64	Asbestos Creek	7		Clr, slt. wind, spotty snw cvr. This flt. was primarily to ascertain elk distribution.
		Porcupine Game Range	332		
		Porcupine Creek	16		
		Twin Cabin Creek	27		
		Rainbow Ranch	10		
		Elkhorn Ranch	15		
		Buffalo Horn Creek	11		
		Wilson Creek	6		
		Daly Creek	1		
		Daly-Tepee Cr. divide	3		
		Crown Butte	202		
		Lava Butte	42		
		Black Butte	4		
		Specimen Creek	2		
		Sawmill Creek	1		
		Lodgepole Creek	5		
		Snowflake Springs	2		
		Sage Creek	81		
		Canyon Creek	5		
		Taylor's Fork	102		
		Slide Creek	29		
		Wapiti Creek	32		
		Meadow Creek	18		
		Lincoln Mountain	29		
		Dead Horse Creek	5		
		Cache Creek	24		
		Mont. Highway Sec. House	5	1016	

TABLE 22 - CONTINUED.

Area	Date	Location	Number Observed		Remarks
			By Drainage	Area Total	
310-311	11/21/64	Porcupine Creek	3		Fogged in. Obs. 149 fr
		Sage Creek	16		grnd 11/20/64. Est.
		Elkhorn Creek	44		250 - 300 in Daly Creek.
		Wapiti Creek	39		
		Buffalo Horn	65		
		Tepee Creek	1	168	
	12/5/64	Porcupine-Twin Cabin	743		Piper 150. Ideal condi.
		Elkhorn Creek	105		
		Buffalo Horn-Wilson	62		
		Tepee Creek	269		
		Tepee-Daly Creeks	5		
		Daly Creek	139		
		Crown Butte	194		
		Lava Butte	10		
		Specimen Creek	15		
		Snowslide Creek	26		
		Monument Creek	32		
		Lodgepole-Sawmill	227		
		Sage Creek	25		
		Wapiti Creek	11		
		Taylor's Fork-Meadow	282	2145	
	12/7/64	Porcupine-Twin Cabin	590		Three helicopters.
		Elkhorn Creek	59		
		Buffalo Horn-Wilson	85		
		Tepee Creek	235		
		Tepee-Daly Creek divide	30		
		Daly Creek	78		
		Crown Butte	240		
		Lava Butte	98		
		Black Butte Creek	3		
		Specimen Creek	15		
		Monument Creek	77		
		Lodgepole-Sawmill	236		
		Sage Creek	12		
		Wapiti Creek	54		
		Taylor's Fork-Meadow	321	2133	
	12/17/64	Porcupine-Twin Cabin	643		Piper 150.
		Elkhorn Creek	74		
		Buffalo Horn - Wilson	54		
		Tepee Creek	92		
		Tepee-Daly Creek	17		
		Daly Creek	11		
		Crown Butte	104		
		Lava Butte	48		
		Black Butte Creek	65		
		Monument Creek	50		Specimen and Snowslide
		Lodgepole-Sawmill	187		Creeks not flown.
		Sage Creek	19		
		Wapiti Creek	100		
		Taylor's Fork-Meadow	162		
		Cinnamon Creek	4		
		Beaver Creek	8		
		Levinski Creek	2	1640	

TABLE 22 - CONTINUED.

			Number Observed		
Area	Date	Location	By Drainage	Area Total	Remarks
310-311	12/28/64	Porcupine-Twin Cabin	615		
		Elkhorn Creek	13		
		Buffalo Horn Creek	21		
		Tepee-Daly Creek divide	45		
		Daly Creek	374		
		Black Butte	6		
		Slide Creek	34		
		Lodgepole-Sawmill	42		
		Wapiti Creek	48		
		Taylor's Fork-Meadow	296		
		Cinnamon Creek	4	1498	
	3/15/65	Elk Mountain (Cherry Cr.)	93		Cloudy, snow.
		Pole Creek	79		
		N. Fork Spanish Creek	1		
		Twin Creek	46		
		Spanish Creek	18	237	
312	3/21/61	S. Fork 16-Mile Creek	81		Poor snow.
		16-Mile Creek	25	106	
	1/8/62	16-Mile Creek	9		Eveng. flt.-good snw condi.
		Haw Gulch	43		
	1/11/62	Haw Gulch	37		Eveng. flt.
	3/8/63	S. Fork 16-Mile Creek	105		Early Morn. No fresh snw. Poor condi.
	3/8/63	Horseshoe Hills	43		Late morn. Poor condi.
	3/21/63	Haw Gulch	93		Poor snow cover.
		6-Mile Creek	2		
		Horseshoe Hills	46	141	
	2/12/64	Armstrong's Ranch	15		Poor snow cover-elk widely scattered.
		Hatfield Mountain	21		
		Haw Gulch	54	90	
	3/9/65	Red Rock Mountain	51)		Snw scat., absent at low eleva.
		Hatfield Mountain	92)		
		Paddy's Run	43)		
		Haw Gulch	46)		
		2 mi. S. 6-Mile	16)		
		Spring Gulch-Hay Cr. divide	48)	296	
313	1/2/62	Deckard Flat	166		Snw-lt. condi. not good.
314-317		E. Eagle Creek	361		
		W. Eagle Creek	135		This repre. minimum cnt.
		Phelps Creek	151		
		Phelps-Trail divide	130		
		Trail Creek	61		
		Maiden Basin	5		
		Basset Creek	19		
		Cedar Creek	2	864	
	1/5/62	Basset Creek	20		
		Cedar Creek	46		
		Slip-Slide Creek	9		
		6-Mile Creek	45	120	

TABLE 22 - CONTINUED.

Area	Date	Location	Number Observed		Remarks
			By Drainage	Area Total	
314-317	1/24/62	Deckard Flat	143		Good snw cvr-wind too strong to do good job.
		Bear Creek	279		
		Eagle Creek	67		
		W. Eagle-Trail	940		
		Trail Creek-Basset	98		
		Basset-S. Side Cedar	82		
		Mol Heron Creek	21	1630	
	2/27/62	Old Barn Creek	5		
		Little Donahue Creek	13		
		Big Creek	12		
		S. Big Creek	54		
		Wagner Creek	5		
		6-Mile Creek	100		
		Emigrant	16	205	
	12/4/62	Cinnabar	18		No Maj. Migration had taken place. Anim. obs. were all ♂.
		Trail Creek	23		
		Basset Creek	15		
		Eagle Creek	23		
		Bear Creek	2		
		Deckard Flat	10	91	
	12/9/64	S. of 6-Mile	25		All ♂. 120 ♀ and calv. were seen Deckard Flat-Crevice Cr. 200+ ♀ and calv. inside Park on Cottonwood Cr. 300+ ♀, calv. and ♂ on Hellroaring Cr. slopes.
		Stands Basin	39		
		Dailey Basin - Dailey Mtn.	85		
		Slip-Slide Creek	8		
		Basset - Little Trail	22		
		Eagle Creek	4		
		Palmer Creek	18		
		Deckard Flat-Crevice Cr.	21	222	
	12/29/64	Pine Creek	52		
		Dome Mountain	67		Bulls.
		Stands Basin	76		20-25 ♀ and calv.
		Dailey Basin	49		
		Slip-Slide Creek	3		Bulls.
		Cedar Cr. S.	1		Bull.
		Basset Creek	39		
		Little Trail Creek	20		Many elk were obs. in Park near Crevice, Cottonwood, Hellroaring, Slough Creeks.
		Deckard Flat	227		
		Upper Deckard	3		
		Big Creek	20	557	
	1/15/65	Little Trail Creek	73		10 bulls.
		Niggerhead	12		Bulls.
		Eagle Creek	58		15 bulls.
		Palmer Creek	15		Bulls.
		Deckard Flat	91		
		Mouth Bear Creek	160		
		Hellroaring Creek	450		Estimate.
		N. of Hellroaring	150		
		Blacktail Creek	400		
		W. of Gardiner	250		
		Game Farm	150		
		Reese Creek	30	1839	

TABLE 22 - CONTINUED.

Area	Date	Location	Number Observed By Drainage	Number Observed Area Total	Remarks
314-317	1/18/65	Little Trail Creek	71		
		Travertine Creek -Eagle Cr.	121		
		N. Side Bear Creek	69		
		Deckard Flat	303		
		Bear Creek-Eagle Creek	45	609	
	1/25/65	6-Mile Creek	157		Minimum count.
		Slip-Slide Creek	4		
		Maiden Basin	3		
		Basset Creek	1		
		Little Trail Creek	138		
		Travertine-Eagle Cr.	267		
		Deckard Flat	123		
		Hellroaring Creek	350		)
		Blacktail Creek	285		)
		Turkey Pen	105		)Minimum count.
		Gardiner Flat	225		
		Reese Creek	110	1768	
	2/5/65	6-Mile	5		Ptly ovrcast, strg winds and snw cvr. 896 seen inside the Park, S. of Deckard, Crevice Cr., Blacktail, Everts, Turkey Pen, Stevens, and head of Cinnabar Creeks.
		Stands Basin	52		
		Dailey Basin	48		
		Cedar Creek	2		
		Slip-Slide Creek	6		
		Basset Creek	26		
		La Duke Spring	26		
		Little Trail Creek	100		
		Devil's Slide	4		
		Niggerhead Mountain	60		
		Travertine Flat	84		
		Eagle Creek	104		
		Bear Creek	69		
		Deckard Flat	108	694	
318	2/7/61	Mahogany Hill	8		
		18 mi. S. of Boulder	9		
		Hadley Park	90		
		Whitetail Creek	10		
		N. Fork Little Boulder	1		
		Galena Gulch	44		
		Bear Gulch	7		
		Boulder River	37		
		Lowland Creek	22	228	
	3/11/61	West of Boulder	3		
		Galena Gulch	44		
		N. of Basin	25		
		Carlson's Ranch	9		
		N. Side Boulder R.	54		
		S. Side Boulder R.	54		
		Lowland Creek	10		
		Little Boulder	34		
		Ratio Mountain G. R.	28		
		Whitetail Creek	7	268	

TABLE 22 - CONTINUED.

Area	Date	Location	Number Observed By Drainage	 Area Total	Remarks
318	1/11/62	Little Galena Gulch	31		Wind made poor counting.
		Watson Gulch	32		
		Poor Gulch	8	71	
	3/31/64	Carlson Ranch	20		Late morn. and dull ovrcast. Poor condi.
	2/17/65	Sheep Creek	3		2 Yllw-1 red tag.
		N. of Sheep Creek	4		Ovrcast, mod. turb.,
		Peterson Creek	19		good snow.
		Lowland Creek	52	78	
319	12/18/62	Mt. Fleecer	30		
	1/1/63	Mt. Fleecer	140		Obs. by G. R. Mgr.
	1/23/63	" "	67		
	3/13/63	" "	62+		
	5/13/63	" "	17		
	5/31/63	" "	3		
	6/5/63	" "	1		
	1/21/63	Dicky Bridge	25		
	3/25/63	Dicky Bridge	4		
	5/4/63	High Rye	19		
	5/6/63	High Rye	25		
	1/4/63	Mt. Fleecer	52		Weather good.
	1/18/63	Mt. Fleecer	144		Ground obs.
	1/24/63	Polish Ranch	62		Ground obs.
	1/26/63	Mt. Fleecer	19		Ground obs.
	1/27/64	Mt. Fleecer	173		Morn. flt.-fav. condi.
		Norton Station	127		
		N. Dickey Bridge	75		
		Jerry Creek	14	389	
	3/3/64	Charcoal Gulch	205		Fav. condi.-snw cvr lt.
		Norton Station	61		in lower areas.
		Dickey Bridge	37	303	
	2/18/65	Charcoal Gulch	232		Weather excl.-snw cvr lt.
		Divide Creek	6		
		High Rye	151		
		Dicky Hills	4		
		Johnson Creek	13		
		Jerry Creek	1	407	
	2/20/65	Mt. Fleecer	103		Ground obs.
		Charcoal Creek	33	136	
	3/23/65	Jimmie New Creek	11		Weather excl., but snw lt.
		Patton Gulch	7		
		Johnson Creek	42		
		Dicky Hills	31	91	
320	1/9/62	Leonard Creek	13		Early aftn. count incidental to waterfowl cnt.
		Warm Springs Creek	22		
		S. Willow Creek	9	44	

TABLE 22 - CONTINUED.

Area	Date	Location	Number Observed		Remarks
			By Drainage	Area Total	
320	3/31/64	S31, T1S, R3W	31		Scat. clouds, snw mltg. rapidly.
		S8, T1S, R3W	23		
		S9, T1S, R4W	5		
		S19, T1S, R2W	3		
		S13, T1S, R3W	14		
		S14, T1S, R3W	5		All bulls.
		N½ S31, T1N, R3W	30	111	
	3/8/65	Limekiln Creek	68		Scattered snow.
		East Butte	5		
		Magpie Creek	9	82	
	4/14/65	Nugget Creek	44		Scattered snw, ptly-mostly cloudy.

TABLE 23. SUMMARY OF COOPERATIVE SURVEYS OF NORTHERN YELLOWSTONE ELK HERD, U.S. PARK SERVICE AND MONTANA FISH AND GAME DEPARTMENT.

Outside Yellowstone National Park	1956	1961	1962	1965
West of Yellowstone River, Park line to Mol Heron	34	16	167	40
East of Yellowstone River, L. Trail Creek to Dome Mountain	210	6	1039	180
Travertine area east to Bear Creek	354	10	1545	182
Deckard Flats	461	35	396	
Total Outside Park	1059	67	3147	402
Total Inside Park	5904	8083	2578	4463
Total Elk Seen	6963	8150	5725	4865

TABLE 24. OBSERVATIONS OF COW DISTRIBUTION IN THE VICINITY OF MADISON-WALL CREEK GAME RANGE

		Number Observed								
		Vegetative Type				Location				
Date	Location	Sage-Grassland	Willows	Aspen	Timber	Bottom	Sidehill	Ridge Top	Creek	Total
6/20/63	English Geo. Cr. S2, T10S, R1W	43*		19*						62
	Dry Hollow S21, T9S, R1W		9					40		49
	English Geo. Cr. S2, T10S, R1W	49*		21*						70
	Hyde Creek S27, T9S, R1W	43				10			7	60
6/21/63	Johnny Ridge Rd. S9, T9S, R1W	39		11						50
6/22/63	Johnny Ridge Rd. S9, T9S, R1W	9		40						49
6/24/63	English Geo. Cr. S2, T10S, R1W	21*		54						75
	Hyde Creek S27-34, T9S, R1W	22	14							36
6/26/63	English Geo. Cr. S2-11, T10S, R1W	46*		19						65
6/28/63	English Geo. Cr. S2-11, T10S, R1W	54		21						75
	Dry Hollow S27, T9S, R1W	26						22		48
	Hyde Creek S21, T9S, R1W	31							13	44
6/30/63	Dry Hollow S21, T9S, R1W	41								41
	Hyde Creek S27, T9S, R1W	23		15						38
7/1/63	English Geo. Cr. S2-11, T10S, R1W	51		29						80
	Hyde Creek S27, T9S, R1W	42					11			53
7/9/63	English Geo. Cr. S2-11, T10S, R1W	57*		43						100
	Dry Hollow S20-21, T9S, R1W	33			14					47
	Hyde Creek S27-28, T9S, R1W	39			21					50
7/12/63	English Geo. Cr. S2-3-11, T10S, R1W	42*		32						74
	Dry Hollow S2-21, T9S, R1W	41								41
	Hyde Creek S27-28, T9S, R1W	28		17						45
9/30/63	English Geo. Cr.	68*								68

* Cows and yearlings.

Area 30 - Lima Peaks

Elk numbers in the Lima Peaks appear to be holding fairly steady since 1962. An average of 164 elk have been observed each year during the winter census since 1961. Only antlered bulls have been hunted since 1961. There is some indication this elk herd moves back and forth between Idaho and Montana. A management program for these elk would necessitate a consideration of the hunting season in Idaho hunting units 58 and 59. A season on cows in Idaho could be reflected in the numbers observed in Montana. If these conditions exist there is no reason for not hunting cows in Montana. Table 25 shows the aerial census figures and elk seasons, 1958-1965. Tables 26 and 27 shows grass condition and cattle utilization in the Lima Peaks (Sawmill Cr.) during 1961, 1963 and 1964.

Transect #314 and a cage are located on the saddle between Deep and Sawmill Creeks on an area of elk winter range where cattle concentrate. Along the entire length of the transect during the spring of 1963, only 40 elk pellet groups were recorded but 160 cattle droppings were found.

Inspection of mesic forb parks in the spruce community in Nicholia Creek revealed some parks were heavily used by elk. Forty elk were observed feeding in one mesic park on July 1, 1963. Dandelion and false dandelion were heavily grazed. Forbs received by far the heaviest elk use. Some grasses were used and these included mountain brome, poas and timothy. It would appear that proper range management would require cattle be removed from these areas. A suggested approach, made by Jim Mitchell of the Forest Service, was to exclude livestock use above the main upper forks in Nicholia Creek.

Area 31 - Pioneer-Horse Prairie

Methods employed on this range, to measure changes in or use of vegetation, include line transects, 2 x 5 dm canopy-coverage plots, clipping and recording grazed plants. Twelve study sites, have been located on this winter range.

Table 28 presents condition, trend and utilization information on elk winter range. Two agronomy cages were clipped in the fall of 1961 in Buffalo Creek. Plot #100 had 60 per cent utilization while plot #478 had 45 per cent utilization. This is utilization by cattle on winter elk range prior to elk arrival.

Table 29 shows percent of grazed plants in the Browns Canyon Creek area on April 28, 1963.

On August 22, 1963 generally light cattle use was observed, except for the south side of Browns Canyon. The Forest Service estimated 60% use on this site. This is primary cattle range but is also used by elk in winter. Cattle are using mostly bluebunch wheatgrass - taking little Idaho fescue. Cattle have been on the elk winter range and have used the grass. The severe sites cannot stand both cattle and elk use. There appears to be less cattle use now than in the past in this general area.

Table 30 gives a summary of grass clippings along with recorded grazed plants in the Browns Canyon Creek area.

The elk winter range adjacent to the Forest is deteriorated. There has been too much cattle use too long on elk winter range in the past. Salt has been placed on elk winter range. During the winter of 1964-1965, perhaps because of deep snows adjacent to the Forest, the elk moved to the open country to the east.

A survey of Buffalo Creek on November 20, 1964 revealed that on the winter elk range at transect #352, a severe site, an estimated 40 lbs./acre of grass and grass-like plants remained. At #353, a severe site, an estimated 50 lbs./acre of grass and grass-like plants were present. A cage in the area since 1961, and never clipped, shows this area does produce grass. Although elk and cattle use was evident in the area the site will not support both. Range improvement is doubtful under these conditions. Additional range data for this area appears in Tables 65, 66, 67.

Line and canopy-coverage data are presented in Tables 31, 32 and 33, for the Browns Canyon Creek area. The 1964 information presented in these tables was obtained at the time the transects were established. In 1964 the total grass intercepted along the line transect was 10.22 feet and in 1965 it was 7.21 feet. Of these totals the percent Idaho fescue (Festuca idahoensis) in 1964 was 63 and in 1965 it was 70. Bluebunch wheatgrass (Agropyron spicatum) occupied 17% along the line in 1964 and 19% in 1965. Other grass plant totals along the line in 1964 was 20% and 11% in 1965. The total number of plants intercepted was 128 in 1964 and 144 in 1965. Forty-six percent of the 1964 number were Idaho fescue plants, 24% were bluebunch wheatgrass and 30% other grasses. In 1965 the fescue totaled 49%, the wheatgrass, 31% and 20% for other grasses. The frequency of occurrance of these plants in 2 x 5 decimeter plots along the transects was as follows:

Species	% Occurrance	
	1964	1965
F. idahoensis	100	88
A. spicatum	90	68
Other grasses	65	--
Total grass	100	98

TABLE 25. AERIAL ELK COUNTS IN LIMA PEAKS AND ELK SEASONS, 1958-1965.

Date	No. Elk Observed	Winter Of	Elk Season	
			1958 - Sept. 21 - Nov. 2	Ant. Bulls
	101	1958-1959	1959 - Oct. 18 - Nov. 1	Ant. Bulls
		1959-1960	1960 - Closed.	
2-9-61	264	1960-1961	1961 - Oct. 21 - Nov. 19	Ant. Bulls
1-17-62	156	1961-1962	1962 - Oct. 21 - Nov. 25	Ant. Bulls
2-22-63	139	1962-1963	1963 - Oct. 20 - Nov. 24	Ant. Bulls
1-29-64	155	1963-1964	1964 - Oct. 18 - Nov. 22	Ant. Bulls
2-19-65	135	1964-1965	1965 - Oct. 23 - Nov. 28	Ant. Bulls

TABLE 26. GRASS CONDITION AND TREND PLOTS AND CATTLE UTILIZATION ON WINTER ELK RANGE IN THE LIMA PEAKS, FALL 1961.

Transect No.	Spp.	% HC&CE	% Ground Cover Rock	Dirt	Plant Matl.*	Av. Density Index in tenths	Av. Max. Leaf Ht. tenths	Fall Cattle Use %	Fall Agron. Cage Util.%
503	Feid	52	1	9	90	.72	.26	63	63
501	Feid	62	12	41	47	.90	.23	69	7

* Includes moss, litter, forbs and grass hits.

TABLE 27. GRASS UTILIZATION ON THE LIMA PEAKS ELK WINTER RANGE, SPRING 1963 TO THE FALL 1964.

Location	Date	Spp.	% of Plants Grazed		% of Plants Non-Grazed		Production #/acre	Grass Left #/acre	Utilization %
			Old	New	Old	New			
Sawmill-Deep Creeks #503	Spr. 63	Feid	56	0	44	100			
Sawmill #502	Spr. 63	Pocu	60	9	40	91			
Sawmill #501	Spr. 63	Feid	42	2	58	98			
314 (was 503)	Fall 63	Feid	83		17				
315 (cage) vic. 314	Fall 63	Grass					2675	763	71[1]
315 (cage)	Fall 63	Grass					1850	570	69[2]
Vic. cage 326[3]	Fall 63	Agsp	8		92				
316 (was 502)	Fall 63	B. grass	14		86				
317 (was 501)	Fall 63	B. grass	17.		83				
314	Spr. 64	Feid	87[4]		13				
314	Spr. 64	Grass						180[2]	
Vic. cage 326	Spr. 64	Agsp	53		47				
326 (cage)	Spr. 64	Grass					1175	1225	
316	Spr. 64	Agsp	50		50				
317 [5]	Spr. 64	Feid	64		36				
314	Fall 64	Feid	83		17				
315 (cage) [6]	Fall 64	Grass					2800[1]	550	81
315 (cage)	Fall 64	Grass					2660[2]	530	81
316	Fall 64	B. grass	59		41				
317	Fall 64	B. grass	56		44				

[1] Green weight.
[2] Dry Weight.
[3] Cage is on elk winter range - little cattle use of this site.
[4] Heavy use the result of cattle.
[5] Not elk winter range.
[6] Est. 70-80% utilization while working on site.

TABLE 28. GRASS CONDITION AND TREND PLOTS AND CATTLE UTILIZATION ON WINTER ELK RANGE IN BUFFALO CREEK.

Transect (old no.)	Year	% HC&CE	% Ground Cover Rock	% Ground Cover Dirt	% Ground Cover Plant Matl.*	Av. Density Index in tenths	Av. Max Leaf Ht. tenths	Fall Cattle Use %	Spr. Use %	Spp.
#100	Spr. 1961								55	Poa
#475	Fall 1961	72	46	9	45	.61	.21	30		Feid
#478	1961	72	34	20	46	.35	.21	33		Feid
#100	1961	72	21	29	52	.37	.22	62		Feid

* Includes moss, litter, forbs and grass hits.

TABLE 29. GRAZED PLANT SURVEY IN AREA 31, BROWNS CANYON CREEK AREA.

			Old Growth		New Growth	
Location	Date	Spp.	Grazed	Non-Grazed	Grazed	Non-Grazed
Watson Creek	N½ S20 T8S R13W					
	4-28-63	Feid	50	50	10	90
Painter Creek	SE¼ SW¼ S30 T8S R13W					
	4-28-63	Feid	76	24	44	56
Brown Canyon Cr.	SE¼ NW¼ S29 T8S R13W					
	4-28-63	Feid	40	60	3	97

TABLE 30. SUMMARY OF GRASS CLIPPINGS AND GRAZED PLANTS ON ELK WINTER RANGE, BROWNS CANYON CREEK AREA (HORSE PRAIRIE).

Location	Date	Grass & Grass-like Plants #/acre	Grass & Grass-like Plants left (lbs.)	Utilization %	% of Agsp plants Grazed
Watson Cr. S20 T8S R13W					
	10-21-63	1200 (Green Wt.)	450	63	62
Watson Cr. S20 T8S R13W					
	10-24-64	260 (Dry Wt.)	250	4	
Vic. Transect #347 (Browns Can. Cr.)					
	10-24-64	--	160 (Dry Wt.)[1]	-	60
South Ridge Browns Can. Cr.					
	10-21-63	675 (Green Wt.)	500 [2]	26	92 [3]
Cage #319	10-21-63	1080 (Green Wt.)	520	52	90
(Painter Cr.)	10-31-64	1020 (Green Wt.)	310	70	88
	10-31-64	900 (Dry Wt.)	280	69	

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[1] Twenty .96 plots were clipped on site and it was found that only 160 pounds (dry wt.) of grass and grass-like plants were left for winter elk use. This is a severe site as shown by line transects. Too much cow use is evident.

[2] Poor sampling.

[3] Grazed close to ground.

TABLE 31. LINE INTERCEPT DATA, BROWNS CANYON CREEK ELK WINTER RANGE 1964 AND 1965, AREA 31.

Line Intercept	Erosion Pavement	Agsp		Feid		Other Grass & Grass-like Plants	
Date	8/7/64	8/7/64	7/3/65	8/7/64	7/3/65	8/7/64	7/3/65
Transect #347 (50' Line)							
I [1]	27.94	1.03	.98	3.36	2.55	.63	.46
II	56.00	2.00	2.00	7.00	5.00	1.00	1.00
III	52.00	19.00	28.00	29.00	33.00	12.00	14.00
IV	.54	.05	.04	.12	.08	.05	.03
Transect #379 (50' Line)							
I	25.81	.68	.41	3.11	2.49	1.41	.32
II	52.00	1.00	1.00	6.00	5.00	3.00	1.00
III	76.00	12.00	16.00	30.00	38.00	26.00	15.00
IV	.34	.06	.03	.10	.07	.05	.02
Both Transects (100' Line)							
I	53.75	1.71	1.39	6.47	5.04	2.04	.78
II	54.00	2.00	1.00	6.00	5.00	2.00	1.00
III	128.00	31.00	44.00	59.00	71.00	38.00	29.00
IV	.42	.06	.03	.11	.07	.05	.03

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[1] I = Total Intercept (Ft.)
II = Basal Coverage (%)
III = No. of Intercepts
IV = Average Intercept (Ft.)

TABLE 32. CANOPY-COVERAGE DATA, BROWNS CANYON CREEK ELK WINTER RANGE 1964 AND 1965, AREA 31 ON TRANSECT #347 AND #379.

	Erosion Pavement 8/7/64-7/3/65		Forbs 8/7/64-7/3/65		Agsp 8/7/64-7/3/65		Feid 8/7/64-7/3/65		Other Grass 1964	Total Grass 1965
	Plots		Plots		Plots		Plots		20 Plots	40 Plots
	20	40	20	40	20	40	20	40		
Canopy-Coverage %	45	36	18	18	12	7	13	6	3	4

TABLE 33. LINE TRANSECT DATA, BROWNS CANYON CREEK (AREA 31) T8S, R13W, S29. SUMMER CATTLE AND WINTER ELK RANGE.

	Total Length (Hundredth-Foot)	Percentage of Whole Line	Number of Occurrences	Average Intercept (Hundredth-Foot)	Average Height (Inches)	Average % Canopy Coverage (10-2 x 5 dm frames at each 50' Line Transect)
Transect #347 (50 feet)						
A. spicatum	1.03	2	19	.05	6	18
F. idahoensis	3.36	7	29	.12	-	16
Other grass and grass-like plants	.63	1	12	.05	-	3
Bare ground, rock, erosion pavement	27.94	56	--	--	-	45
Forbs (including selaginella)	--	-	--	--	-	18
Transect #379 (50 feet)						
A. spicatum	.68	1	12	.06	5	6
F. idahoensis	3.11	6	30	.10	-	10
Other grass and grass-like plants	1.41	3	26	.05	-	3
Bare ground, rock, erosion pavement	25.81	52	--	--	-	46
Forbs (including selaginella)	--	-	--	--	-	17
Transects Combined						
A. spicatum	1.71	2	31	.06	6	12
F. idahoensis	6.47	6	59	.11	-	13
Other grass and grass-like plants	2.04	2	38	.05	-	3
Total	10.22[1]	10	128[2]	.08		

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[1] Of the total grass intercepted (10.22 feet), *F. idahoensis* occupied 63 percent of the length; *A. spicatum*, 17 percent; other grass and grass-like plants, 20 percent.

[2] Of the total grass occurrences (128), *F. idahoensis* comprised 46 percent; *A. spicatum*, 24 percent; other grass and grass-like plants, 30 percent.

The dominant grass at the site of the transects and plots would appear to be A. spicatum, however it comprised less than two feet along 100 feet of line transect. The importance of the area to elk is indicated by the fact 70 elk were observed near the transects on January 29, 1964.

Transects have been renumbered in the area. Old and new numbers are:

New	Old
353	100
354	475
355	478
388	399
387	398

During the fall of 1963 a general field survey was conducted south of Lemhi Pass along the Continental Divide which included the north and south Forks of Frying Pan Creek. Some heavy cattle use was observed on the high upland parks within the National Forest. The upland parks are generally in a deteriorated condition because of overgrazing. The area would appear to have a high value for watershed and wildlife. Areas with steep slopes such as this should be considered unsuitable for domestic stock grazing. On north slopes there is a dense cover of spruce. South exposures are more open with Lodgepole and some Douglas Fir and Limber Pine. Open parks are generally only on southern exposures. Many places in the area have been altered by mining operations and prospecting in the past. Roads are rather numerous in parts of the area.

In the vicinity of Trapper Creek (south of Lemhi Pass) Agropyron and Idaho fescue occurs in much of the area. Many of the areas are overgrazed, especially outside the National Forest. Deer were commonly observed in both timber and open parks. This area is summer elk and deer range but not elk winter range. This is typical summer elk range consisting of dense spruce on north exposures and very small parks along drainage bottoms. Some of the mesic bottoms observed are heavily overgrazed, probably by cattle, and this would appear to affect elk use to some extent. Along the Continental Divide, much open country that may be elk winter range was observed in Idaho, partially substantiating the assumption that elk from this Montana area winter in Idaho.

Along Bear Creek south of Lemhi Pass, certain upland parks have been overgrazed by cattle and the creek bottom is severely overgrazed. A bull with very large antlers and from 6 to 10 cows were observed in open Douglas fir timber on a steep southeast exposure.

The lower bottom parks of Black Canyon are overgrazed by cattle. Most of the upland parks inside the Forest Boundary are unsuitable cattle range as they are too steep for cattle. The amount of bottom mesic parks in the canyon is limited. There is also considerable down timber in the drainage. These physical features would indicate the primary use of the area should be for watershed and wildlife. The cattle grazing is not enhancing the wildlife aspect of the area.

Nip and Tuck Creek, North Fork of Divide Creek and the south rim of Black Canyon contain many large areas of open range. Drainage bottoms and parks that are summer elk habitat are severely overgrazed by cattle. In the North Fork of Divide Creek, willow has been extensively over-used. Cattle may be limiting the amount of elk and moose use in the high spruce open parks.

In Horse Prairie Creek, east of Bannock Pass, certain areas were sprayed in 1956 to control sagebrush. This was possibly the first such control program in Beaverhead County. There does not appear to be very much summer elk range in the head of Horse Prairie, but old elk sign including spring and summer droppings were observed. In Sections 10 and 11 grass on the high ridges and steep slopes was in very good condition with little current use. These ridges may be elk winter range. The cattle range in this area is generally in good condition, however drainage bottoms especially in sprayed areas, appear to be over-used.

Eighteen sites on the Vipond-Devils Hole elk winter range have been measured since 1960. Line transect, grazed plant transects, 2 x 5 dm canopy-coverage transects and agronomy cages have been used to obtain condition, trend and utilization of these areas by both elk and cattle.

Utilization, trend and condition of grass plants at the sites are presented in Tables 34, 35 and 36 for 1960 and 1961. Utilization of grass in the Vipond-Devils Hole area in 1963 is shown in Table 37. The extent of use on A. spicatum during the 1964-65 winter is given in Table 38.

In 1963 there were approximately 1000 head of cattle on the Vipond allotment, of which 9000 acres are classed as primary cow range. On September 23, 1963 cattle were making use of the ridges in the area that are elk winter range. The rim or ridge on the north side of Devils Hole is primary elk winter range but it is also used by cattle. Salt blocks have been placed on the ridge in the past and are currently placed there.

Vipond Park and Mud Slope are probably not primary elk winter range although elk may occur there during mild winters. These areas do receive cattle use, therefore it is not likely elk are involved with the range problems here. It was also noted during the summer of 1963 that there was heavy cattle use in Trusty Gulch (east of the drift fence.)

Table 39 presents range information for the Devils Hole-Trusty Gulch area obtained on June 17, 1964. Most of the use was on top of the rim, with utilization decreasing down the south side. Few elk pellets were found near transect #303 although cattle droppings were numerous. At the time the information in Table 39 was collected, deep snow drifts still remained in the vicinity. The presence of these drifts would indicate the areas were not available to elk during the winter.

All the vegetation under an agronomy cage was also clipped on June 5, 1965. This cage, located on the rim of Devils Hole, had not been disturbed for several seasons prior to the June 1965 measurement. Production inside the cage (dry weight pounds of vegetation) was 2640 lbs./acre and outside the cage there were 1180 lbs./acre. The amount of vegetation utilized outside the cage at the time of clipping and weighing was 55%. Utilization by the grazed plant method on top of the rim of Devils Hole was 35%.

On February 15, 1963 one hundred and three elk were observed in Trusty, Vipond and Mud Slope. Ordinarily it would be an exceptionally mild, snow-free winter when elk would be using these areas. On April 5, 1963 forty-six elk were observed on Devils Hole. Upper Trusty was snowed in. On May 20, 1963 twenty-three elk were observed in the Vipond-Mud Slope area. On January 27, 1964 eighty-nine were on the rim of Devils Hole and 20 in Cattle Gulch. On March 20, 1965 ninety-five were on the rim of Devils Hole and 20 in Cattle Gulch. Elk pellets have been observed in Trapper Creek, upper Canyon Creek and Brown's Gulch.

Tables 40 and 41 present line transect and canopy-coverage information from sites beginning at the rim of Devils Hole and descending downward. Transect #370 is on top of the ridge on a relatively flat site and receives heavy cattle and elk use. Salt for cattle was placed in this area in 1965. Transect #371 is slightly down the slope from #370. No. 372 is on a steep slope and A. spicatum is probably the dominant grass here. The remaining transects are placed successively further down the slope. It appears the further down the slope the transects occur, the steeper the slope and the more A. spicatum increases. There is a corresponding decrease in forbs.

TABLE 34. GRASS CONDITION AND TREND PLOTS AND UTILIZATION FIGURES, VIPOND 1960.

Transect (Old Nos.)	Form Class % Y&N	Form Class % HC&CE	Av. Plant Density Inches	Av. Max. Leaf Ht. Inches	Fall Use %	Spring Use %
146	57	43	19.7	2.7	20	48
328	63	37	7.1	3.1	5	-
314	40	60	5.5	3.7	5	5
305	63	37	16.7	4.0	5	-
?	42	58	5.7	1.9	57	-
300	--	--	--	--	--	43

TABLE 35. GRASS CONDITION AND TREND PLOTS AND CATTLE UTILIZATION ON WINTER ELK RANGES VIPOND, FALL 1961.

Transect (Old Nos.)	Spp.	% HC&CE	% Ground Cover Rock	Dirt	Plant Matl.*	Av. Density Index in Tenths	Av. Max. Leaf Ht. Tenths	Fall Cattle Use %
150	Feid	69	4	29	67	.47	.20	76
701	Feid	29	7	9	84	.51	.47	53
314	Feid	40	89	0	11	.43	.38	0
305	Feid	46	44	32	24	1.23	.35	0-5
146	Feid	40	31	9	60	1.44	.23	0-5
149	Feid	55	1	26	73	.34	.31	64
328	Feid	42	42	4	54	.90	.29	0-5
307	Feid	77	9	22	69	.27	.23	76
147	Feid	69	32	20	48	.27	.25	39

* Includes moss, litter, forbs, and grass hits.

TABLE 36. COMPARISON OF UTILIZATION DATA OBTAINED FROM AGRONOMY CAGE CLIPPINGS AND GRAZED PLANT METHOD, FALL 1961.*

Location	Transect (Old No. and Location)	% Grazed Plant Utilization	% Agronomy Cage Utilization
Vipond	150 Trusty Gulch Divide	76	53
Vipond	147 Mud Slope	39	52
Vipond	307 Mud Slope	76	82

* Utilization by cattle on winter range prior to elk arrival.

TABLE 37. PERCENT OF PLANTS GRAZED IN THE VIPOND-DEVILS HOLE AREA FOR 1963, SPRING AND FALL.

Transect No.	Location	Date	Spp.	Grazed Growth Old	Grazed Growth New	Non-Grazed Growth Old	Non-Grazed Growth New
	Vipond-Mud Slope	Spr. 63	Agsp	94		6	
	Vipond-Mud Slope	1963	Agsp	40		60	
	Vipond-Mud Slope	1963	Agsp	44		56	
	Vipond-Mud Slope	1963	Agsp	97		3	
307	Vipond-Mud Slope	1963	Feid	68	4	32	96
306	Vipond-Mud Slope	1963	Feid	85		15	
304	Vipond-Mud Slope	1963	Feid	80	6	20	94
305	Vipond-Mud Slope	1963	Agsp	75		25	
303	Trusty Gulch	1963	Feid	63	0	37	100

TABLE 37 - CONTINUED.

Transect No.	Location	Date	Spp.	Grazed Growth Old	Grazed Growth New	Non-Grazed Growth Old	Non-Grazed Growth New	
390	Devils Hole	1963	Feid	22		78		
303	Trusty Gulch	Fall 63	Agsp	45		55		
304	Mud Slope	Fall 63	Agsp	50		50		Production 1220 #/acre Grass left 500 #/acre
	Mud Slope	Spr. 64	Agsp	82		19		Utilization 60% 1/
305	Mud Slope	Fall 63	Agsp	34		66		Production 2553 #/acre Grass left 1443 #/acre Utilization 44%
306	Mud Slope	1963	Feid	68		32		Production 3100 #/acre Grass left 967 #/acre Utilization 70%
	Vipond	1963	B. grass	50		50 2/		
	West end Vipond	1963	B. grass	76		24 2/		
	Forest Ser. Vipond	1963	B. grass	40		60 2/		Production 633 #/acre Grass left 566 #/acre Utilization 20%
	Vipond	1963	B. grass	36		64		
307	Vipond	1963	Agsp	4		96		

[1] Field estimated utilization 60 percent. Coincides with figure from sample. (Production for all cages is green weight).

[2] Not elk winter range.

TABLE 38. PERCENT OF A. SPICATUM PLANTS GRAZED - JUNE 5, 1965 (1964 GROWTH).

Location	Spp.	No. Plants Grazed	No. Plants Non-Grazed	% of Plants Grazed
Rim of Devils Hole 1/	Agsp	174	44	80
#358	Agsp	140	23	85
Rim Devils Hole	Agsp	123	30	80
Off Rim Devils Hole to South	Agsp	20	80	20
Off Rim Devils Hole to South	Agsp	120	92	57
Off Rim to South	Agsp	27	100	21
About 300-400 Yds off Rim to South	Agsp	76	72	51
Top Rim Devils Hole	Agsp	66	6	92

[1] There is a good cover of Agsp and Feid in Devils Hole indicating this plant community probably approaches climax conditions. Use is not excessive except for very top of rim. Most grazed sites have about four inches of Agsp stubble, however, a few small sites are grazed down to about two inches of stubble.

TABLE 39. GRAZED PLANTS, TRUSTY GULCH-DEVILS HOLE IN AREA 31, JUNE 17, 1964.

Transect No.	Location	Spp.	Number Plants Grazed	Number Plants Non-Grazed	% of Plants Grazed
328 (New #390)	Ridge West of Devils Hole	Agsp	159	170	48
-	Rim of Devils Hole	Agsp	351	82	81
303	Trusty Gulch	Agsp	52	61	46*
303	Trusty Gulch	Feid	118	17	87*
- 1/	Ridge N. of Cattle Gulch Spring	Agsp	674	126	84

* Numerous cattle droppings at this site.

1/ Data collected June 5, 1965.

TABLE 40. LINE TRANSECT DATA FROM DEVILS HOLE ELK WINTER RANGE, AREA 31. TRANSECTS INSTALLED AND READ JULY 1 AND 2, 1965.

Transect No. Line Interception		#370 50' Line	#371 50' Line	#372 50' Line	#373 50' Line	#374 50' Line	#375 50' Line	Totals All Transects 300' Line
Agsp	I1/	2.00	1.75	2.43	2.23	3.41	4.42	16.24
	II	4.00	4.00	5.00	4.00	7.00	9.00	5.00
	III	33.00	28.00	22.00	25.00	30.00	25.00	163.00
	IV	.06	.06	.11	.09	.11	.18	.10
Feid	I	4.25	1.71	3.13	3.18	4.15	3.04	19.46
	II	9.00	3.00	6.00	6.00	8.00	6.00	6.00
	III	41.00	29.00	37.00	34.00	53.00	26.00	220.00
	IV	.10	.06	.08	.09	.08	.12	.09
Other Grasses	I	1.59	1.35	.23	.01	.02	--	3.20
	II	3.00	3.00	T	T	T	--	1.00
	III	53.00	41.00	10.00	1.00	1.00	--	106.00
	IV	.03	.03	.02	.01	.02	--	.03
Total Grasses Along Line	I	7.84	4.81	5.79	5.42	7.58	7.46	38.90
	II	16.00	10.00	12.00	11.00	15.00	15.00	13.00
	III	127.00	98.00	69.00	60.00	84.00	51.00	489.00
	IV	.06	.05	.08	.09	.09	.15	.08
% Composition (from total basal intercept)								
Agsp		26.00	36.00	42.00	41.00	45.00	59.00	42.00
Feid		54.00	36.00	54.00	59.00	55.00	41.00	50.00
Other Grasses		20.00	28.00	4.00	T	T	--	8.00

1/ I = Total Intercept (ft.)

II = Basal Coverage (%)

III = Number of Plants Intercepted

IV = Average Intercept (ft.)

T = Less than 5%

TABLE 41. CANOPY-COVERAGE DATA, DEVILS HOLE ELK WINTER RANGE AREA 31, JULY 2, 1965.

	Average % Canopy-Coverage						All Transects
Class	#370 10 Plots	#371 10 Plots	#372 10 Plots	#373 10 Plots	#374 10 Plots	#375 10 Plots	60 Plots
Bare Ground	5	23	22	31	26	29	21
Total Grass	48	41	44	36	50	47	44
Forbs	20	12	12	11	10	6	12
Agsp	7	9	25	18	14	22	16
Feid	34	19	12	14	22	13	19
	% Frequency of Occurrence						
Agsp	50	80	100	80	80	90	80
Feid	100	80	90	100	100	90	93
	% Composition (2 x 5 dm plots)						
Grass	79						
Forbs	21						
Browse	0						

Certain transects were renumbered in this area as follows:

New	Old
303	150
304	307
305	147
306	149
307	146
-	148
-	305
389	314
-	701
390	328
358	300

Area 32 - East Big Hole

One of the more important elk wintering areas in southwestern Montana lies along the east side of the Big Hole Basin from Carroll Hill north to the Fish Trap School. It appears this elk herd is increasing in size.

Sound management of this elk herd is complicated by diverse land ownership, deep snow conditions, haystacks adjacent to the winter range, public opinion, and elk wintering on private land. Approximate land ownership of the elk winter range is as follows: Bureau of Land Management, 5%; State, 10%; National Forest, 40%; and deeded, 45%. During an aerial flight on February 7, 1965 over one-half the elk observed were on private land. Numerous haystacks attract elk off the key elk winter range to bottom lands. Generally, the key elk winter range follows very closely along the National Forest boundary, extending approximately a mile to the east or west of the boundary. East of the winter range is dense conifer and deep snows, westward is the relatively flat pasture and haylands of the Big Hole basin, which are usually covered with deep snow. Elk travel some distance from the winter range to the haystacks. Since much of the elk use on private lands is related to haystacks, it would be helpful to build these haystacks as far west of the winter range as possible and should be fenced to keep elk out. Such fences should be kept free of drifting snow. Those stacks used by elk were observed to have snow drifted high around the stack fences. Some ranchers try to keep elk out of their haystacks; other ranchers think they are helping the elk by allowing them to get into the stacks. Elk have been going to haystacks in this area for at least 25 years. Even in years of a light snow cover, haystacks are used.

In the Big Hole, snow depth and temperature can and does vary widely between years. There is not only this yearly variation, but also a difference in snow conditions between the north and south end of the elk winter range, with more snow-free southern exposures on the north end. These conditions have a marked effect on elk. If a good stand of grass was left on the elk winter range, each fall, the elk range may not be as marginal as previously thought. However, until there is sufficient native feed for the elk, the range is marginal. Elk are capable of pawing for feed if it is there under the snow. A substantial, healthy elk herd could be maintained on the Big Hole winter range if sufficient grass was left each fall, especially on southwest exposures and ridges just inside the National Forest boundary. Very little range work had been initiated on the elk winter range in the Big Hole prior to 1964. Department personnel had been over much of the area while inspecting sagebrush spray projects and surveying wildlife range. Part of the elk winter range within the National Forest was mapped in the fall of 1964. It was important that range transects be installed to measure utilization, condition, and trend of this range on certain key sites. This work was initiated in the spring of 1965.

The first step in proper management of the elk herd is to increase elk forage on southwest exposures and ridges just inside the National Forest. Presently cattle are over-grazing, at least certain sites, within the National Forest, on this elk winter range.

Because the elk winter range is so very limited it would be desirable to keep cattle off all key elk winter feeding sites (southwest exposures and ridges). This still leaves much area for cattle to graze inside the Forest, but calls for better distribution rather than a reduction of cattle numbers.

Much of the winter range between Sand and Walker Creeks has been or is proposed for sagebrush spraying. Bull Creek at the south end of the winter range was sprayed in 1959. Factual information indicating sagebrush spray programs benefit wildlife is a rarity.

At least some willow bottoms have been severely damaged by cattle over-grazing within the elk winter range area. Willows are extremely important to an elk herd wintering in an area of deep snows.

Elk are a natural and desirable part of the Big Hole area. However, access to and range conditions on the National Forest are two important aspects of maintaining elk in this area. Solutions to those two problems must be worked out if a sound elk management program is to exist.

An educational program directed towards landowners and administrators explaining the need for and the operations necessary to holding elk on the wintering areas adjacent to the Forest boundary may materially assist in solving the problems.

On March 7, 1963, following a winter with a well below average snow cover, elk were using to a limited extent, the short green blue grass (Poa spp.) on a southwest exposure of Sheep Creek at the Forest boundary. Fringed sage was "greening up" and showed elk use. Utilization of bluebunch wheat grass (Agsp.) is shown in Table 42. Use of A. spicatum at this site increased by only 10 percent from March to May 1963. The new green growth of rough fescue (Festuca scabrella), which is rather abundant inside the Forest boundary, received heavy elk use during the spring. Nearly every plant observed was used. Elk apparently seek out this species. Late in May the elk were moving towards the mountains and using the sagebrush-grass parks along Sheep Creek. In one of the larger parks, F. scabrella was 8 to 10 inches tall and heading out.

Table 43 shows the percent of F. idahoensis plants grazed on Carroll Hill. This use was recorded on 1964 growth. Of 1531 F. idahoensis plants sampled, 87% were grazed. This is very heavy use.

Recently there has been some concern about the winter elk range in the vicinity of Carroll Hill. There are advantages to acquiring this area as a winter elk range, however, consideration should be given to the whole winter range and not just the top of Carroll Hill. The entire area would be described as lying within the following boundary: beginning at Big Hole Pass, then west along the Highway to the Jackson Ranger Station, then north from the station along the foothills to Fox Creek, then east and south across Warm Springs Creek to Woody Mountain, then southeast across the head of Bull Creek to Pole Creek to the Circle 'S' Ranch buildings and then south along the road to the Highway and then west to Big Hole Pass. The important winter range on the National Forest must also be considered. On February 7, 1965 one hundred and seventy-six elk were counted in this area. Since some elk were missed, 200 or more probably wintered here last season. The best portion of this winter range (due to exposure and snow cover) probably lies within the area bounded by Warm Springs Creek, Woody Creek, Butch Hill and the Highway. Any program (including acquisition) that results in more grass for the elk would be desirable.

Table 44 shows grazed grass plant percentages on elk winter ranges in Toomey and Squaw Creek. Heavy elk use of meadow bottoms in Toomey Creek was not observed during the spring of 1965, but there has been severe cattle use of the bottoms in the recent past. Soil loss was noted in the sagebrush-grasslands up from the bottoms. Cattle use in Toomey Creek is excessive. Fifty-one elk were observed on the north ridge of Toomey on March 20, 1965. On certain sites there was evidence of severe elk use. Elk droppings were very numerous. On some sites no old growth was present. The 1964 growth has been completely used. It has been grubbed into the ground. Elk appear to be the cause of the deterioration on the ridge. The sites of deep snow cover have some old grass growth left. The other sites are completely denuded. No apparent grass stubble remains. Cattle have heavily used the elk winter range. Cattle use has resulted in bottoms being over-grazed and completely utilized, causing a tendancy to move to unsuitable sites and elk winter range. One thousand, four hundred and thirty-three bunchgrass plants were sampled on the north ridge of Toomey Creek. All of these were grazed and usually eaten to the ground.

On Sawlog Creek (north of Toomey) there was no apparent use of the lower meadow bottom by elk during the spring of 1965. No difference was noted inside or out at the lower Forest Service agronomy cage in Sawlog bottom. The cage further up Sawlog bottom shows light spring elk use. It is apparent cattle are damaging the creek bottoms and elk are damaging the ridges.

Table 44 shows Sawlog as receiving lighter usage than Toomey. The use was by both cows and elk. This is a steep southwestern exposure with a dense cover of sagebrush about 30 inches tall, which probably holds snow and also hinders grass usage under sage plants.

The Squaw Creek area as shown in Table 44 is severely over-used mostly by cattle. There were too few grass plants to run a grazed plant sample.

It appears it may be necessary to fence cattle off elk winter range on National Forest land. It may be necessary to try this in the Big Hole in order that some grass is left for winter elk use.

TABLE 42. GRAZED PLANT TRANSECT #351 BIG HOLE-SHEEP CREEK ELK WINTER RANGE.

Date	Spp.	No. Plants Grazed	No. Plants Non-Grazed	Total	% of Plants Grazed	Remarks
3/7/63	Agsp	74	26	100	74	
3/7/63	Agsp	75	25	100	75	
5/23/63	Agsp	85	15	100	85	1962 Growth.
5/23/63	Agsp	4	96	100	4	1963 Growth (heavy use of Fesc.)
10/27 and 10/28/64	Bottom utilization estimated at 90-100% cattle use.					
10/28/64	Agsp	70	16	86	81	
10/28/64	Agsp	15	17	32	47	
10/28/64	Agsp	133	47	180	74	

TABLE 43. PERCENT FEID GRAZED ON CARROLL HILL, JUNE 10, 1965 (1964 GROWTH).

Transect	Spp.	No. Plants Grazed	No. Plants Non-Grazed	% of Plants Grazed	Location
None	Feid	244 1/	31		From bottom of winter elk range, north to Deadhorse 1/ 7881 feet. (N. from road at Pass)
None	Feid	198	63	76	N. from Deadhorse 2/ to Radio Repeater.
None	Feid	190	40	83	
None	Feid	703	62	92	W. of Radio Repeater 3/- SW exposure to Bull Cr. (Sec. 6)

1/ 89% of the Feid plants were grazed by livestock and elk range is in poor condition. It has been over-used the past grazing season.

2/ Winter range is about 8,000 ft and noted a buck antelope here on 6/10/65. Elk use of Lupinus noted. Eight to ten foot snowbanks in area on this date. Range producing far less than potential.

3/ Deteriorated sites. Rocky-very severely over-used. 150 [illegible]

TABLE 44. GRAZED PLANTS ON ELK WINTER RANGE IN THE BIG HOLE, JUNE 11, 1965 ON 1964 PLANT GROWTH.

Location	Spp.	No. Grazed	No. Non-Grazed	Total Plants	% of Plants Grazed
Toomey Cr. SW exp. SW¼ S29 T1N R13W	B. grass	200	0	200	100
SW exp. S½ S30 T1N R13W	B. grass	344	0	344	100
N. Ridge Toomey just inside Forest boundary	B. grass	889	0	889	100
Sawlog Cr. Extreme NE¼ S21 T1N R13W	B. grass	136	63	199	68
NW¼ S21 T1N R13W	B. grass	195	61	256	76
Squaw Cr. center S26 T1N R14W (BLM land)	--	- 1/	--	-	-

1/ Too few grass-like plants present. One hundred steps taken and at each step, the toe being used as a point, the following was recorded: "hits" on any grass or grass-like plant - 20%, "hits" on bare gound-rock-erosion, 80%.

The very poor condition of Toomey has been recorded by line transects and canopy-coverage plots that were installed in 1965.

Only 3% basal coverage was recorded for all grass plants but about 60% was recorded for bare ground with another 10% for rock. The basal intercept of A. spicatum was much less than 1% and had a canopy-coverage of 1%. The total grass canopy-coverage was only 8%.

Tables 45 and 46 gives complete data on 300 feet of line transects and 100 canopy-coverage plots in Toomey Creek. Table 47 lists the 100 canopy-coverage plots recorded in Squaw Creek.

Of 300 feet of line intercept on Toomey Creek, only 9.65 feet was grass and grass-like plants with a basal intercept of 3%. Grass and grass-like plants include all bunchgrasses, sedges and annual grasses.

The percent grass composition on Toomey Creek was as follows:

From Total Basal Intercept		From Total Number of Grass Plants	
Agsp	7	Agsp	6
Feid	25	Feid	13
Other Grasses	68	Other Grasses	81

Stipa comata appeared to be the most abundant grass plant on the Toomey ridge. Use on big sagebrush by elk was observed.

Cattle droppings are very numerous on this severely abused winter range. Many of the "other grasses" (Table 45) measured along the line will have dried up and be gone before winter. Little grass forage is produced on this range for elk winter usage.

Canopy-coverage data from Toomey Creek was as follows:

Percent Frequence of Occurrence		Percent Composition of Forage Classes	
Agsp	28	Grass	36
Feid	50	Forbs	56
Total grass	99	Browse	8

Canopy-coverage data from Squaw Creek as determined on July 8, 1965:

Percent Frequence of Occurrence		Percent Composition of Forage Classes	
Agsp	34	Grass	56
Feid	54	Forbs	43
Total grass	100	Browse	1

Very heavy to severe elk and cattle use was noted in Squaw Creek. Sagebrush has been sprayed by the Forest Service in Squaw Creek. An excellent stand of grass, after spraying sagebrush occurs on the more mesic bottom sites where it has also received non-use by cattle. However, there was not much, if any, recovery of grass on severe sites with a low density of sagebrush to begin with. Nothing was gained by spraying sagebrush on such sites, and may even be harmful to elk habitat as less desirable brush may be increasing.

Elk winter range was also sprayed in Squaw Creek. One stand of aspen in Squaw Creek was especially hard hit by sagebrush spraying. Elk calve in these areas. Some sprayed aspen appears to have recovered. Some deeded land inside the Forest boundary was sprayed and apparently shortly there after was grazed by cattle. The general appearance of the area would indicate the spray operation did not solve any problems.

TABLE 45. LINE INTERCEPT DATA FROM TOOMEY CREEK ELK WINTER RANGE, AREA 32. TRANSECTS INSTALLED AND READ JULY 7, 1965.

Transect No. Line Interception		#380 50' Line	#381 50' Line	#382 50' Line	#383 50' Line	#384 50' Line	#385 50' Line	Totals All Transects 300' Line
Bare	I 1/	30.58	25.36	30.32	27.85	26.13	35.25	175.49
Ground	II	61.00	51.00	61.00	56.00	52.00	71.00	58.00
	III	83.00	72.00	100.00	97.00	54.00	78.00	484.00
	IV	.37	.35	.30	.29	.47	.45	.36
Rock	I	2.08	6.91	8.61	4.50	4.41	1.42	27.93
	II	4.00	14.00	17.00	9.00	9.00	3.00	9.00
	III	10.00	18.00	33.00	16.00	11.00	6.00	94.00
	IV	.21	.38	.26	.28	.40	.24	.30
Big	I	4.00 2/	4.23	.00	.00	3.62	.00	11.85
Sagebrush	II	8.00	8.00	--	--	7.00	--	4.00
(Crown	III	1.00	3.00	--	--	6.00	--	10.00
Interc.)	IV	4.00	1.41	--	--	.60	--	1.19
Agsp	I	.00	.12	.09	.21	.11	.12	.65
	II	--	T 3/	T	T	T	T	T
	III	--	2.00	5.00	8.00	2.00	5.00	22.00
	IV	--	.06	.02	.03	.06	.02	.03
Feid	I	.69	.30	.21	.81	.38	.01	2.40
	II	1.00	1.00	T	2.00	1.00	T	1.00
	III	16.00	5.00	2.00	18.00	8.00	1.00	50.00
	IV	.04	.06	.11	.05	.05	.01	.05
Total	I	.93	1.43	1.14	1.24	.80	1.06	6.60
Grasses	II	2.00	3.00	2.00	2.00	2.00	2.00	2.00
Along	III	45.00	65.00	71.00	44.00	32.00	58.00	315.00
Line	IV	.02	.02	.02	.03	.03	.02	.02

1/ I = Total Intercept (ft.)
II = Basal Coverage (%)
III = Number of Plants Intercepted
IV = Average Intercept (ft.)

2/ Read as Crown Intercept.

3/ T = less than 5%

TABLE 46. CANOPY-COVERAGE DATA FROM TOOMEY CREEK ELK WINTER RANGE. READ 100, 2 x 5 DM PLOTS, JULY 7, 1965. (SAME LOCATION AS LINE INTERCEPT TRANSECTS).

	%							No. Elk Pellet Groups (Winter 1964-65) per 500 sq. ft. ea. transect	
Transect No.	Bare Ground	Rock	Big Sagebrush	Total Grass	Total Forbs	Agsp	Feid		
#380	56 1/	14	1	5	9	.3	2	15	
#381	56	15	1	5	7	1.00	3	11	
#382	49	25	0	5	10	2.00	1	6	
#383	47	5	4	15	24	2.00	8	14	
#384	32	18	6	13	20	.4	4	7	
#385	55	3	0	7	7	1.00	4	4	
All	49	13	2	8	13	1.00	3	57	855 groups/acr

1/ Average percent canopy-coverage for all plots on the site.

TABLE 47. CANOPY-COVERAGE DATA FROM SQUAW CREEK AT CONFLUENCE WITH PAPOOSE CREEK ELK WINTER RANGE, AREA 32. 100 2 x 5 DM PLOTS, JULY 8, 1965.

Canopy-Coverage % 25 Plots	Bare Ground	Rock	Living Brush	Total Grass	Total Forbs	Agsp	Feid
Site I	46	33	1	8	19	7	1
Site II	63	.2	0	10	10	1	5
Site III	42	3	0	37	7	6	22
Site IV	62	1	0	11	13	0	.3
All Sites	53	9	.3	16	12	3	7

Grass is usually in better condition in sagebrush stands because it is less available to cattle and elk.

Chrysothammus viscidiflorus is very abundant on parts of the elk winter range in Squaw Creek. It has received very heavy elk use and was often eaten almost to the ground.

The location of the transect sites in Toomey and Squaw Creek are plotted on aerial photos and topographic maps along with additional information and are on file with the Fish and Game in Dillon.

Area 33 - Gravelly-Snowcrest Complex

Utilization information for the Blacktail and Centennial winter ranges is presented in Table 48. Utilization on the Wall Creek area is presented in a separate segment of the W-73-R 9-10-11 completion report. Utilization for 1963 was lighter in all instances than in 1962 on the Blacktail and Centennial.

The Centennial ranges are on State, Bureau of Land Management and private holdings. Utilization data suggest light grazing on areas sampled for the two years. In 1962, a winter of heavy snow accumulation, haystack depredations in the Murphy-Metzel Creek area were recorded.

In 1963, one hundred and forty-seven elk were observed in the Murphy-Metzel Creek area in late February. This compares to the number (140) observed in 1962 in the same general area. In 1963, snow cover was light and no depredation to stacks were reported.

No elk were observed on Long Creek above the Wilson ranch. In mid-January, 45 elk were observed on the sand hills near Tepee Creek (S7, T12S, R1W). About 40 were observed in Metzel Creek southwest of Patchtop Mountain and 31 were observed in Snowshoe Creek east of Patchtop. No elk were observed in either Tepee or Snowshoe Creek in late February when the 147 were seen on Murphy Creek. The remainder of the Centennial area was not intensively checked.

Observations through the summer of 1962 on the Robb, Ledford and Alkali Creek areas indicated that most spike fescue plants were not producing seed stalks and were in poor vigor. Utilization of spike fescue in 1962 and 1963 was greater than Idaho fescue in areas where both species occurred together.

A calf:cow ratio of 57:100 in a sample of 369 cows and calves was observed in January 1963, in the Gravelly-Snowcrest complex. The observed sex ratio was 19:100 (45 bulls, 235 cows). A sex ratio of 41♂:100♀ and a calf:cow ratio of 58:100 among 811 elk was observed during a helicopter flight in September 1961.

It would seem desireable to obtain pre-and post-season classification counts of elk in this area for two reasons. First, the area is subject to intensive hunting which promotes concern over the presumed imbalance between the sexes. Pre-and post-season classifications would provide comparative data and help answer many questions from sportsmen. Second, some areas are less intensively harvested than others within area 33

(Tables 49 through 53) and classifications by locality are needed to help determine how this is affecting the various populations. Robinson (1962) found that population ratios from various areas serve to facilitate comparisons. The increasing popularity of this management unit, reflected in the hunter questionnaire data, emphasizes the necessity for more information concerning the component elk populations. Classification data should be listed by wintering area in the future.

Tables 49 through 53 are summaries of data collected a five checking stations operated during the three day season for either sex elk in the area 33 during October, 1962. The stations were opened the morning of the first day and closed when only sparse hunter travel was indicated each night. Three thousand, four hundred and sixty-three hunters were checked through the stations (Table 49) which compares with 5,082 hunters from the questionnaire data. The Ruby station checked 46% of the hunters, the West Fork Madison station, 26%, the Blacktail station 14% and the two Ennis stations 14%. Ninety-two percent of the hunters were checked out the first three days and 98% by the fourth day. Subsequent checks made through the area suggested little activity after the fourth day of hunting.

Six hundred and eleven elk were checked, including 65 after the stations closed. The questionnaire indicated a harvest of 1,424 elk. Hunter success according to the questionnaire was 28%, the station data indicated 17% success. Two-thirds (393) of the elk were checked through the Ruby station, one-fourth (158) through the West Fork stations and about one-tenth (60) through the remaining three stations.

Sixty-four percent of all checked through the stations were killed the opening day, and 87% the first two days (Table 50).

Table 51 presents sex and age of 335 elk checked through the stations. Eighty-four bulls, 142 cows and 89 calves were examined. The sex ratio was 59♂:100♀ and the calf:cow ratio 63:100. Table 52 is a list of sex and age of 139 elk checked through the Ruby station. Thirty-five percent of all elk aged were yearlings (22 yearling bulls, 26 yearling females). The percentage of calves in these data is thought to be disproportionately larger than actually occurred, as this class was more readily aged than older animals. Also some older animals could not be aged due to ordinary problems in the operation of the station. The data does suggest that three-fourths of the harvest was comprised of calves and yearlings.

The Cottonwood-Burnt Creek, Coal Creek, and Timber Gulch area on the Upper Ruby, and the Lobo Mesa, Elk River and Freezout Creek area on the West Fork Madison were localities of intensive harvest (Table 53). Few elk were harvested on the Blacktail, Centennial and Wall Creek areas, all of which are winter ranges. The data suggest heaviest harvest occurred in the Upper Ruby. In 1961, it is thought the heaviest harvest occurred on the winter ranges on Wall Creek and the Blacktail.

TABLE 48. 1962 AND 1963 ELK WINTER RANGE SURVEYS.

				% Utilization			
				1962		1963	
Area	Location	Transect #	Spp.	Current	Past	Current	Past
33	Long Creek	214	Feid	-	16	-	0
33	Murphy Creek	263	Feid	-	19	-	10
33	Ledford Creek	198	Heki	-	76	-	10
			Feid	-	16	-	5
33	N. Fork Blacktail	395	Heki	-	over 50	0	0
			Feid	-	-	0	0
33	Alkali Creek	-	Heki	-	over 50	-	5

TABLE 49. NUMBER OF HUNTERS CHECKED THROUGH AREA 33 CHECKING STATIONS, 1962.

	Ruby	(both stations) Ennis	West Fork	Blacktail	Total
1st day	601	189	155	193	1138
2nd day	406	128	196	132	866
3rd day	565	189	260	166	1180
4th day	54	--	164	--	218
5th day	--	--	71	--	71
Total	1620	506	846	491	3463

TABLE 50. DATES OF KILL OF ELK CHECKED THROUGH AREA 33 CHECKING STATIONS.

	Ruby	(both stations) Ennis	West Fork	Blacktail	Total
1st day	250	35	111	16	392
2nd day	68	4	27	3	102
3rd day	25	0	15	2	42
Total	323	39	153	21	536

TABLE 51. SEX AND AGE OF ELK CHECKED THROUGH ALL STATIONS.

	Ruby	Ennis	West Fork	Blacktail	Total
Adult ♂	4	7	21	1	33
Yearling ♂	22	9	18	2	51
Bull Calf	16	2	9	2	19
Cows	42	15	94	11	142
♀ Calves	38	5	15	2	60
Total ♂	26	16	39	3	84
Total ♀	42	15	94	11	142
Total Calves	54	7	24	4	89

TABLE 52. SEX AND AGE OF ELK CHECKED THROUGH RUBY STATION.

Bulls	94	(32%)
Cows	206	(68%)
♂ 8½ +	0	
♂ 2½ - 7½	4	
♂ 1½	22	
♂ ½	16	
♀ 8½ +	3	
♀ 2½ - 7½	18	
♀ 1½	26	
♀ ½	38	

TABLE 53. NUMBER OF ELK HARVESTED BY LOCALITY.

Area	Number	Area	Number	Area	Number
Cream-Ledford-Robb Cr.	12	Divide-Pole Cr.	20	Cascade-Fossil Cr.	4
Ice Cr.-Powder Gulch	27	Peterson Basin-West Cr.	16	Blacktail	12
Timber Gulch	30	Lobo Mesa	34	Landon	21
Warm Springs-Lazyman Cr.	10	Elk River	37	Tepee-Lobo Cr.	2
Cottonwood-Burnt Cr.	57	Freezeout-Soap Cr.	32	Antelope Basin	4
E. Fork-Poison Cr.	25	Short-Tributary Cr.	5	Antone	3
Coal-Basin Creeks	58	Wigwam-Crockett Lake	21		
Dog-Lewis Creeks	22	Cherry-Ruby Creeks	3		
W. Fork-Beaver Creeks	12	Horse-Wall Creeks	5		
Hawkeye-Corral Creeks	11	Standard-Gazelle Cr.	1		

Area 34 - Highlands

There is very little information available for this area concerning the condition of the elk range. Four elk were observed on McCartney Mountain during the winter of 1962. In 1962 about 80 elk were observed in Hells Canyon and vicinity.

A grass transect (#319) was established in 1961 on the ridge south of the Moose Creek road. The following information was obtained from the transect in 1961: Form Class % of Y & N, 63%; of HC & CE, 37%; the average plant density inches, 8.3; average maximum leaf height in inches, 5.0; and percent of fall use, 5%.

During October 1961 the Forest Service clipped utilization cages in the Moose-Camp Creeks area. The information collected follows:

Humbug (Junction of Burton Park Road and road to Pine Gulch)

Produced	2000 #/acre
Left	260 #/acre
Utilization	84%

Moose Creek (South-facing sagebrush slope above road in SW¼, S36, T1N, R8W)

Produced	900 #/acre
Left	200 #/acre
Utilization	78%

Area 35 - Whitetail

A minimum of information is available for this area. Data from two transects, #801 and #802 appears in Table 54.

Area 36 - East Madison

Two major elk wintering areas on the east Madison are in the vicinity of Bear and Wolf Creeks. During the winter of 1961-62, over 150 animals were seen on Wolf Creek, 216 on Bear Creek, 36 on Jack Creek, and 47 on Indian Creek.

A calf:cow ratio of 40:100, obtained in January 1963, on Bear Creek suggested moderate production. One hundred and sixty-one elk were classified.

The south facing slope just within Wolf Creek Canyon (S36, NW¼) consists of a bluebunch wheatgrass overstory with an understory dominated by cheatgrass, some Idaho fescue and native bluegrass. The Trail Fork of Bear Creek and White Pine Flats plots are on areas rated in fair condition. Utilization of Idaho fescue was heavy on these three areas in 1962 and 1963 (Table 55).

TABLE 54. CONDITION AND UTILIZATION AT TRANSECTS #801 AND #802.

Transect No.	Date	Spp.	% HC&CE	% Ground Cover Rock	Dirt	Plant Matl*	Av. Den. Index in Tenths	Av. Max. Leaf Ht. Tenths	Fall Cattle Use %
#801	1961	Feid	81	16	51	33	.41	.30	39
#802 (Galena Gulch)	1961	Feid	83	2	45	53	.35	.25	57

* Includes moss, litter, forbs, and grass hits.

#801	1961	Cage Clipped	Outside	400#/acre
			Inside	1000#/acre
			Utilization	60%

TABLE 55. 1962 AND 1963 ELK WINTER RANGE SURVEYS.

Area	Location	Transect No.	Spp.	% Utilization 1962 Current	1962 Past	1963 Current	1963 Past
36	Wolf Creek	--	Feid	--	40	25	35
36	Bear Creek (Trail Fork)	363	Feid	--	37	--	35
36	Bear Creek (North Fork)	--	Feid	--	--	--	25
36	Burger Creek	--	Feid	--	--	--	29
36	Mill Creek	175	Feid	--	28	22	40
36	Tolman Creek	--	Agsp	--	--	0	22
36	Tolman Creek	--	Feid	--	--	15	25

Haystack depredations by elk were reported in January 1963 adjacent to the Bear Creek Game Range. These stacks were subsequently observed to be paneled.

Aerial surveys suggest that four areas in the Bear Creek vicinity were used frequently by elk in January through March, 1963. They were: Tolman Hill (NW¼ S15), White Pine Flats-Burger Creek Pass (S26 E½ S25), North Bear Creek (NW¼ S36 and E½ S35), Trail Fork Bear Creek (N½ S7). Ground observations in April 1963 suggested Trail Fork (W½ S1) was also used extensively.

Section 7, Trail Fork and Bear Creek, was used by 26 elk from January through mid-February. No sign was observed in that section during March. The area is located about one mile upstream from the slopes which open onto the Madison valley. It consists of a few open scattered parks interspersed through conifer timber, on the south facing slope, and dense conifer timber on the north facing slopes.

A group of 57 elk were seen on Tolman Hill. In mid-January, 39 were observed. Through the winter this number increased from 41, 47, 49 to finally 57 in mid-March. Trails observed from the ground suggested that this group also used the south side of Mill Creek (S15 and N½ S22).

Cameron Creek was used very little by elk from January through March, apparently due to snow conditions. The ridge in W½ S36 and S35, separating Cameron Creek from the valley was used mostly by mature bulls. Fifteen bulls were observed in this vicinity.

Over 70 elk were observed in the White Pine Flats-Burger Creek Pass area. This area is over 7000 feet in elevation, contains large bunchgrass areas with alder, birch and chokecherry stands along drainages and conifer timber at the highest elevations. It is rough, broken country containing many exposures and slopes.

Critical or "key" elk winter range areas on the east Madison side include Wolf Creek Canyon, Trail Fork Bear Creek (W½ S1) White Pine Flats-Burger Creek Pass and Tolman Hill.

The general mid-October through mid-November hunting season does not provide a stable annual harvest of these elk populations. The area is generally rugged, scenic terrain with poor accessibility by vehicle travel. Elk may not be available at the lower, more accessible elevations unless winter conditions arrive early. In the Wolf Creek area, heavy snow cover also may limit accessibility during some years.

Range condition and trend surveys should be established at Wolf Creek and a more extensive series of surveys should be initiated on the Bear Creek area. Distribution and classification surveys should be continued. A trapping and marking program at Bear Creek and at Wolf Creek should be initiated to determine where these respective populations are being harvested and where they spend the summer.

Fall utilization checks in the Wolf Creek and Tolman Hill areas should be made to determine whether or not livestock are grazing these areas intensively.

Area 37 - Bull Mountain

Much of this area is deeded land owned by a grazing association. A checkerboard ownership pattern of deeded and Forest land presents certain management problems concerning big game.

Data from two transects (#869 and #82) is shown below:

			% Utilization			
			1962		1963	
Location	Transect Number	Spp.	Current	Past	Current	Past
Potters Slope	869	Feid	12	39	10	22
Bull Mountain	82	Agsp	--	11	--	--
Bull Mountain	82	Pose	--	16	--	5
Bull Mountain	82	Agsp	--	--	--	9

Area 38 - Radersburg

A range inspection trip from June 27-29, 1961 was made by Glen Cole, Jim Harvey, Ranger at Townsend and LeRoy Ellig. Dual and single use elk and livestock ranges were inspected in the Tizer and Eagle Creek areas. Results of the inspection are shown in Table 56.

Spring forage use by elk in the areas inspected could not be considered excessive either from the standpoint of retarding succession to grass types or competing with livestock for forage. Actually, the situation appears comparable to the Little Belts where elk respond to and use weed types which have resulted from livestock grazing. However, the summer range in the Tizer area appears to be so well watered and the spruce timber zone has such abundant forage as to be superior to the Little Belts summer range. From this one inspection, conflicts between elk and livestock or watershed values were not apparent. However, since the Forest Service is in a program of intensified livestock management, quantitative information on range trends, elk and livestock forage utilization should be obtained. The department is currently working with the Forest Service to jointly obtain such information and it is expected that existing problems will be progressively defined and in time resolved.

An inspection trip was made of the Crow Creek area by Ellig and Harvey July 9, 10 and 11,(1962). Ellig reported the heaviest elk use in Muskrat Creek in the forb type parks. Poe, Manley and Longfellow Parks had little sign of summer elk use. Ellig states, "In summary, areas of poor range condition are ones in which domestic livestock graze. This is the second year we have been unable to find any extensive areas of heavy elk spring or early summer use on the high summer range".

Kirsch observed in 1963 that the most severely over-used areas in the Crow Creek area was in the vicinity of Bullock Hill. This area is in the spruce zone at about 8,000 feet and apparently is used by elk and sheep and is within a cattle allotment. The rough fescue has been severely overgrazed. Winter type elk pellets were found on the southern exposure of Bullock Hill. Degree of use by livestock and elk was not determined on this inspection.

Table 57 shows condition and utilization for transects on elk range in Area 38.

Area 39- Lower Big Belts

One wintering area was surveyed in April, 1963 on Cayuse Creek, Avalanche Gulch drainage (SW¼ S22 SE¼ S23 T11N R2E). This area consists largely of shallow soils with a shale parent material, bluebunch wheatgrass and rough fescue overstories with Idaho fescue and native bluegrass understories. Slopes are steep. Very little utilization was noted on grasses other than rough fescue. Wheatgrass and Idaho fescue plants appeared to be in good condition. Table 58 is a summary of information obtained from two transects on rough fescue. Fifty plants were sampled in each area.

Current utilization was excessive and condition was generally poor, for both transects. The whole slope, east to Needham Mountain, was examined and the majority of the area appeared to be in similar condition. Four localities, all level areas upon the slope, contained large concentrations of elk pellet groups.

The Forest Service is currently attempting to put the adjacent sheep allotment under proper use management. The slopes have been classified as unsuitable for livestock grazing due to their unstable soil conditions. The mouth of Cayuse Creek is under private ownership, partially fenced, and to some degree restrains cattle from using the drainage. Current plans are to request the permittee to refrain from using the drainage as much as possible. Some cattle sign was noted on the slopes.

Fifty-three elk were observed on this slope in March, 1963. Sixty-six were seen in January, 1962. In 1964 the transect in Cayuse Creek was 'read'. Table 58 presents the information obtained. At the time the survey was conducted, 27 elk were observed 3/4 mile west of the transect.

Range condition and trend studies should be initiated on this slope. Fall utilization checks of rough fescue should determine the degree of livestock usage.

Since this is one small wintering area among several in Area 39, a special season confined to the Avalanche Gulch drainage could be used if elk are determined to be the major cause of over-utilization of this range. A late season on antlered bulls could perhaps affect distribution favorably. If such a season does not correct the over-utilization, a limited issue of either sex permits would be most desirable.

Area 313 - Gardiner

There is one transect (304) on elk range in this hunting area. The following readings have been recorded on Idaho fescue.

Location	Date	Density Inches	Max. Leaf Ht. (In.)	Form Classes %		Condition Class
				N&Y	HC&CE	
#304	1959	6.4	3.9	30	70	P
(Deckard Flats)	1960	4.2	3.5	42	58	F

TABLE 56. RANGE CONDITION AND TREND. TIZER AND EAGLE CREEK AREAS, JUNE 1961.

Area	Use	Type	Condition*	Probably Trend**	Remarks
Manley Park	Sheep-Elk	Fesc-Feid	$\frac{G}{G}$	↑	Very lt. spring elk use (-10%) Fesc.
Long Park	Elk ***	Weed	$\frac{F}{F}$		Mod. spring elk use on dandelion and other forbs only.
Bullock Hill	Sheep	Fesc-Feid	$\frac{E}{G}$	↑	No detectable spring elk use Fesc shows evid. (HC&CE of severe over use 5-8 yr ago.
Rabbit Gulch Park	Elk ****	Feid-Agsp	$\frac{F}{F}$	↑	Very lt. spring elk use in Feid; occasional Fesc. and forbs.
Airport Park	Sheep-Elk	Weed	$\frac{P}{F}$	↓	Lt. spring elk use on forbs, no use detected on grass.
Longfellow Park	Cattle-Elk	Feid-Pose	$\frac{F}{F}$	↑	No spring elk use detectable.

* Upper rating vegetation, lower soils.
** Based on HC & CE bunchgrasses, soil cover, etc.
*** Cattle and sheep use eliminated one year.
**** On old (10 yr ago?) sheep driveway.

TABLE 57. GRASS CONDITION AND UTILIZATION FOR INDICATED TRANSECTS IN AREA 38.

Location	Spp.	Date	Form Y & N	Class % HC&CE	Av. Plant Density (In.)	Av. Max Leaf Ht. (In.)	Fall Use %	Spr. Use
Jenkins Gulch								
#272	Feid	1960	62	38	4.3	3.6	5	30
#272	Feid	1961					47	30
#272	Feid	1962						32
#272	Feid	1963					48	40
#379	Feid	1961	59	41	14.9	4.3	--	20
#382	Fesc	1961	8	92	9.0	6.6	54	--
#382	Feid	1962						24
Slim Sam								
#880	Feid	1958	77	23	5.8	4.8		
#387	Feid	1961					10	
Poe Park								
	Feid	1962					33	
	Feid	1963						

An agronomy cage was clipped in the fall of 1961 in the head of Jenkins Gulch with the following results: Production was 1000 #/acre; Amount left was 225 #/acre; Utilization was 78%.

TABLE 58. CONDITION AND UTILIZATION OF FESTUCA SCABRELLA ON CAYUSE CREEK, AVALANCHE GULCH DRAINAGE, APRIL 1963.

Lower Plot		Upper Plot
49	# plants grazed of 50	49
72	% utilization	72
7	# normal condition	8
14	# hollow center recent	11
1	# hollow center decomposed	3
11	# clump edge recent	14
17	# clump edge decomposed	14
98	% plants grazed	92
16	% normal plants	8
84	% HC and CE	92

Area 314 - Emigrant

There is one transect (#195) on elk range in this hunting district. The following readings have been recorded on Idaho fescue.

Location	Date	Density Inches	Max. Leaf Ht. (In.)	Form Classes % N&Y	Form Classes % HC&CE	Condition Class
#195	1959	3.5	3.9	54	46	F
(Big Creek)	1960	3.8	3.8	42	58	F

Area 318 - Butte Basin

Minimal information is available for this area. Table 59 presents range data obtained in 1961, 1962 and 1965.

Area 319 - Fleecer-High Rye

The High Rye and Fleecer Mountain elk winter ranges have each been treated in detail in separate reports. Data on the other elk winter range in hunting area 319, Johnson-Jerry Creek, is presented here. While High Rye and Fleecer are in good shape, range wise, the Johnson-Jerry Creek range is in very poor condition. The result of too much livestock use for too long. Most of the deer and elk winter range in this area is on Bureau of Land Management land. B. L. M. land has been severely abused by livestock over-grazing. Presently there are too many elk on this range. Livestock are competing with elk and elk have come out second best. The following information concerning elk use will point out the deteriorated range condition.

Transect #320 5-17-63 Dickey Hills Area

Agsp Percent of Plants Grazed Old Growth	Agsp Percent of Plants Grazed New Growth	Feid Percent of Plants Grazed Old Growth	Feid Percent of Plants Grazed New Growth
98	80	99	69

During a range inspection trip north of Dickey Bridge on April 9, 1964 samples of 100, 200 and 140 A. spicatum plants were 100% grazed. The area is used by deer, cattle and elk.

Ninety-two elk were counted in this area on March 20, 1965. However, this count was made late in the morning, there was a lack of snow on the slopes and the entire area was not completely covered.

During early July, 1965 about 30 head of black cattle were observed grazing on the over-used ridges in the Dickey Hills area.

In the vicinity of the Dickey Bridge and north of the Big Hole River, is a large area of deteriorated range. Steep, severe sites slope to the river. These ridges could be classified as erosion pavement and probably unsuitable for cattle range. Because of exposure and lack of winter snows, these sites should make good elk winter range, (if grass forage was available for elk winter use). It appears the entire region has had a long history of severe livestock use, resulting in the present conditions. Deer are destroying the sagebrush cover, but these places usually have a good grass cover. There are some sites in the Dickey Hills and in the vicinity of Johnson Creek being severely over-grazed by elk. Especially on those sites adjacent to the timber. Most winter range, north of the Big Hole is under the management of the B.L.M. The greatest detrimental impact on this area is an excessive amount of livestock. Elk damage is present, but localized, while livestock damage is wide spread.

There are too many elk in the Dickey Hills area. These elk should be reduced and this includes shooting cows and calves. We have no elk problem on Fleecer or High Rye. Where these elk summer is presently unknown. To inaugerate and maintain a big game management program in this area without controlling the big game and the livestock in order to allow the range to respond will be impossible.

Between Jerry and Jimmie New Creeks especially on the higher southwest exposures adjacent to conifer cover, numerous elk pellets were observed. Some of these sites have been severely grazed. Nearly all of this area is B.L.M. land. Domestic stock use on this B.L.M. land, which is also key elk winter range, should be investigated. Domestic stock remove most of the grass before winter.

Area 320 - Tobacco Root Mountains

Six elk winter ranges in the Tobacco Root Mountains were flown in late March 1963. Elk were observed on: Fletcher Creek (R2W T5S S14), Indian Creek (R4W T4S S9), Table Mountain (R2W T4S S5), Camp Creek Reservoir (R2W T3S S9) and North Willow Creek (R3W T3S S12). Table 60 lists elk observed in each area. Snow cover was light and sparse; observing conditions were rated as poor.

No elk were seen on the South Boulder during these flights, probably due to the poor conditions. Sixty-one were seen in this area in January, 1962.

All of these wintering areas were also used by cattle. The Table Mountain, Camp Creek, North Willow and Indian Creek areas are largely National Forest land. Fletcher Creek is B.L.M. and private ground. The South Boulder is largely private land.

Range checks on the Table Mountain and Camp Creek areas suggested the possibility of elk-livestock competition. The Indian Creek area consists of extremely steep slopes.

It is recommended that distribution, classification, and population trend data continue to be obtained for elk in this area. A series of utilization cages should be established on the National Forest winter ranges. If individual ranchers express interest, utilization data may be gathered from private lands. Present elk populations do not seem to be in serious conflict with private interests and should be maintained at present levels unless grazing conditions change or subsequent information indicates otherwise.

Analysis of Gravelly-Snowcrest Elk Marking Program, 1956-1962. (J. M. Peek)

An elk marking program was in progress in the Gravelly-Snowcrest complex between 1956-1961 to determine movement patterns of various elk populations. One hundred and fifty-four calves were marked. Ear tags with plastic ribbons attached were used as markers (Rouse, 1957). Each animal was marked so it could be identified individually in the field. Return data were primarily from hunter kills, with a few observations of marked calves in the field. The calf marking program was terminated after June 1961. It was thought that trapping and marking adult elk on the winter ranges would provide information more quickly than calf marking. In February 1962 twenty-three elk were trapped and marked on Alkali Creek of the Blacktail drainage. Sufficient returns have been recorded from these programs to warrant examination.

A major problem in considering the return data concerns the unknown amount of dispersal or erratic movement patterns which may be displayed especially in the younger age group (Altman, 1960, Maguire, et.al. 1954, Hamilton, 1962). Greatest dispersal may be expected in the yearling age class, especially among males. Calf movements, at least during the first summer, may be governed by its mother, assuming she is at least 30 months old. Therefore, calf return data were considered less likely to exhibit dispersal than return data from older animals. Another problem lies in determining what constitutes dispersal movement as compared to normal movement patterns.

Procedure first considered the chronology of returns in relation to marking date in order to provide age composition of the data. Next, sex criteria was considered. Return data by calving areas were then examined.

Table 61 lists temporal distribution of return data. Eighty-three percent of all tags were returned within 19 months after marking. Forty-three percent of return data were from animals 18 months old and 40% from calves 5 or 6 months old. Only 39 returns involving 25 percent of total elk marked were available, but the small sample would suggest an exploitation rate among the marked animals comparable to that suggested for Judith elk by Picton (1961).

Total returns were about equally divided between males and females (Table 62). Seven male and seven female calves, eight female and 10 male yearlings, five female and two male adults, were returned. Two-thirds of yearling returns occurred from 1960 and 1961 tag years, or in 1961 and 1962, suggesting that especially high exploitation rates occurred in 1961 and 1962. An observed sex ratio, made by helicopter in early September 1961, was 41♂:100♀. Proportion of sexes in adult returns compared to this ratio. A slightly higher proportion of yearling males in the returns than yearling females may indicate greater vulnerability of males in this age group than females to the gun. The above conclusions are corroborated by checking station information gained in 1962 and presented in another segment of this report, and by hunter questionnaire and checking station data presented in earlier completion reports.

Return classification data were analyzed by calving area (Table 63). Two general areas were search for calves, upper Ruby River above Three Forks Cow Camp and West Fork Madison River from Freezeout Creek to Landon Ridge. Long Creek and West Fork Madison above Miner Creek were considered as being within the upper Ruby area. Goble Flat, Fish Creek and Tepee Creek on the Red Rock drainage were considered along with West Fork returns.

Rouse (1957) found the distances calves moved from locality tagged ranged from 0.5 to 4 airline miles in the summer. Two calves tagged on the East Fork Ruby were subsequently observed on Burnt Creek and Poison Creek. Three calves tagged near West Fork Ranger Station were subsequently observed in the Coal Creek and Fox Creek areas. Calves marked in the upper Ruby were observed in Coal Creek and Peterson Basin areas by Peek in 1959 and 1960. A calf tagged in Goble Flat was subsequently observed by Rouse in Cascade Creek. Data suggest that calves remained in the general vicinity but at higher elevations than the June tagging site for the first summer. Subsequent information will be considered under the assumption that this distribution remained the same through the hunting season or else was influenced by migration to winter ranges. One possible bias in this assumption lies in any effect hunting pressure may have had on distribution away from normal summer home range before a calf was killed.

Ruby Calving Area Returns

Six of ten returns from calves tagged in the upper Ruby were made the subsequent hunting season. Of these six, three were from the general location of the marking site, two were from the Blacktail area, and one from Landon Ridge. Four returns were from yearlings. Of these, two returns were from the Ruby and two from the Blacktail. No returns were from animals older than 18 months.

Five elk marked in February 1962 on Alkali Creek were recovered in October 1962. Two, an adult female and yearling female, were killed in Burnt Creek, in the upper Ruby. Two yearlings were killed on Coal Creek. One yearling was killed in the Blacktail.

TABLE 59. CONDITION AND UTILIZATION OF GRASS PLANTS.

Location	Spp.	Date	% HC&CE	% Ground Cover Rock	Dirt	Plant Matl*	Av. Den. Index in Tenths	Av.Max. Leaf Ht. Tenths	Fall Catt Use %
N.Boulder-Pole Mt. #803	Feid	1961	66	38	42	20	.95	.32	0-5
#803	Feid	1962	Percent plants grazed, old growth 52.						
#803	Agsp	1962	Percent plants grazed, old growth 48.						
Berkin Flat #318A	Feid Agsp	1965	Percent plants grazed, old growth 59-new growth is 5.						

* Includes moss, litter, forbs and grass hits.

TABLE 60. LOCATION AND NUMBER OF ELK OBSERVED IN THE TOBACCO ROOT MOUNTAINS IN LATE MARCH, 1963.

Fletcher Creek	25
Indian Creek	29
Table Mountain	34
Camp Creek Reservoir	15
North Willow Creek	13
Total	116

The data infer migration between the upper Ruby drainage and Blacktail drainage. Few elk have been observed to remain in the upper Ruby during most winters and large concentrations appear on the Blacktail.

Little evidence of dispersal was noted in these returns, but dispersal among specific groups within the Ruby and Blacktail could not be considered. One return, a yearling male marked in Shovel Creek, was from Powder Gulch, and could be attributable to dispersal.

Rouse (1957) reported no observations of tagged elk in the Murphy-Metzel Creek area of the Centennial Valley during the winter of 1956-57.

West Fork Madison Area Returns

Twenty-eight returns were available from 116 calves marked on the West Madison area. Seven of these returns were from the hunting season after marking. One of the seven was from an area other than the marking area, the Blacktail. This return may be attributed to dispersal or migration to winter range, but is the only return from this age group from a wintering area. Thirteen returns were from yearling elk. Of these, five were from the area where tagged. These five were all yearling males. Eight returns (5 males and 3 females) were from areas other than the West Fork. Seven were from the upper Ruby, one from the Blacktail. Seven returns were from adult animals. Of these, four were from the West Fork area (three females, one male) and one each from the Ruby (female), Blacktail (female) and Wall Creek, Madison drainage (male).

Ten of 21 individuals older than 6 months were killed in the area where tagged. Of the eleven returns from different areas, six were males and five females.

A further breakdown may be made of the West Fork calving area. One, lower West Fork, would include the area between Portal and Freezeout Creek plus adjacent Tepee Creek on the Centennial Valley side. Another would include Landon Ridge and Fish Creek.

TABLE 61. AGE AND SEX CRITERIA EXHIBITED IN ELK RETURN DATA, GRAVELLY-SNOWCREST.

Marking	Return Year															
	1956		1957		1958		1959		1960		1961		1962		Total	Total
Year	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	Marked	Returned
1956	2	1	0	0	0	0	0	0	0	1	0	0	0	0	15	4
1957			2	1	1	0	0	3	0	0	1	0	0	0	19	8
1958					2	0	1	1	0	0	0	0	0	0	24	4
1959							0	0	2	0	0	0	0	0	44	2
1960									1	0	4	1	1	1	24	8
1961											2	4	3	4	28	13

Total calves returned:	15	(6 ♀ and 9 ♂)
Total yearlings returned:	17	(6 ♀ and 11♂)
Total adults returned:	7	(5 ♀ and 2 ♂)
Total animals marked:	154	
Total animals returned:	39	25% return

TABLE 62. SEX CHARACTERISTICS OF ELK RETURN DATA, GRAVELLY-SNOWCREST.

Age	Female	Male	Total
6 months	7	7	14
18 months	8	10	18
Over 18 months	5	2	7
Total	20	19	39

Seventeen returns from the lower West Fork were received. Of these, seven were from the lower West Fork, one from Landon Ridge, six from the upper Ruby and adjacent Red Rock drainages, two from the Blacktail, and one from Wall Creek. Six yearlings (four males, two females), two adult females, and two female calves constitute returns away from the lower West Fork, and indicate the possibility of dispersal movement in some of these returns.

Of 11 returns from the Landon area, five (2 male calves, 1 male yearling, 1 female adult, 1 male adult) were from the marking area. Two, both adult females, were from the lower West Fork, one adult female was from the Blacktail and three (yearling male, yearling female, adult female) were from the Ruby. A calf tagged in Snowshoe Creek (Landon area) was subsequently observed in Cascade Creek by Rouse (1957). A return of a Landon tagged elk in the Long Creek area complemented a return of a Long Creek tagged elk in the Landon area. One return of a calf tagged in the lower West Fork was recorded in the Landon area. Some indication that elk from the Landon area constitute a group apart from the lower West Fork elk exists. It is also suggested that the Landon elk winter on the Centennial ranges.

Only one return was from the Wall Creek area in the data examined. All other return data suggest westerly movement towards the Blacktail drainage. The absence of return data from Wall Creek suggested a population separate from West Fork and Ruby elk was wintering in this area. Summer concentrations of elk in the Ruby Creek, Hyde Creek and Wall Creek areas exist. A single return of a Wall Creek tagged elk was from the Cottonwood Creek area on the Ruby (yearling male).

No return data were recorded from the Ledford-Robb Creek area. Only one return (yearling male tagged in the Upper Ruby) was located below Cottonwood Creek on the Ruby. It was on Powder Gulch. Again, negative data suggest that elk wintering on Ledford-Robb Creek are a distinct group from the elk wintering on the Blacktail area, and from those summering on the upper Ruby and West Fork Madison areas.

TABLE 63. LOCATIONS OF ELK RETURNS AND WORKING AREAS, GRAVELLY-SNOWCREST.

Mark-ing Area	Return Area																												Total
	Upper Ruby							Blacktail							Landon							Lower West Fork							
	Calf		Yrlg		Ad		Ttl	Calf		Yrlg		Ad		Ttl	Calf		Yrlg		Ad		Ttl	Calf		Yrlg		Ad		Ttl	
	♂	♀	♂	♀	♂	♀		♂	♀	♂	♀	♂	♀		♂	♀	♂	♀	♂	♀		♂	♀	♂	♀	♂	♀		
Upper Ruby	2	1	2	0	0	0	5	1	1	0	2	0	0	4	0	1	0	0	0	0	1	0	0	0	0	0	0	0	10
Landon	0	0	1	1	0	1	3	0	0	0	0	0	1	1	2	0	1	0	1	1	5	0	0	0	0	0	2	2	11
Lower West Fork*	0	0	3	2	0	1	6	0	1	1	0	0	0	2	0	1	0	0	0	0	1	2	1	4	0	0	0	7	17
Wall Creek	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
																													39

* 1 return also in Wall Creek area included in total (adult male).

Conclusions:

The marking and return data to date are too meagre to provide adequate information from any segment of the Gravelly-Snowcrest elk populations. Further marking, preferably in winter, should alleviate this scarcity. Several tentative conclusions may be reached pending further information. It seems that elk wintering in the Blacktail drainage will often be harvested in the upper Ruby River and upper West Fork areas. Elk wintering in the Murphy-Metzel Creeks-Patchtop Mountain area will often be harvested in the Cascade Creek area. Elk wintering on Wall Creek or Robb-Ledford Creeks may not be expected to be harvested in the upper Ruby or West Fork areas.

Recommendations:

Winter marking should be transferred to Wall Creek and Robb-Ledford Creek areas. The area south of Cottonwood Creek on the Ruby, the Blacktail, Centennial, and West Fork Madison drainages could be split off from the lower Ruby and east side Gravelly Range areas for hunting purposes.

Four Methods for Recording Vegetative Changes on Bunchgrass Elk Winter Ranges in Southwestern Montana (J. B. Kirsch)

To better understand and describe what is occurring on elk winter ranges in southwestern Montana it is necessary to know something about the plant cover and what is happening to it. The main interest is in the biotic effect grazing animals have on this vegetative cover, because the condition of this cover will determine the carrying capacity of the winter range. The purpose of this report is to explain four methods that have been used in southwestern Montana to record utilization, trend and condition. Heavy cattle use during the summer on many elk winter ranges further complicates the management problem.

The following four methods are explained in detail.

1. Line Interception.
2. Canopy-Coverage Plots.
3. Herbage Clipping.
4. Percent of Plants Grazed.

Line Interception Method:

This method modified from Canfield (1942), consists of recording the horizontal linear measurement of grasses as well as ground surface features along a line. The intercept of each grass plant is measured exactly along the course of the line. This gives a numerical value of the amount of ground completely occupied by grasses under the line. The following detailed procedure for establishing the line intercept method has been devised after "reading" about 3,000 feet of line on elk ranges in southwestern Montana.

1. Greatest efficiency is obtained from a two man field crew.

2. Select the site on the elk winter range to be sampled. (Do not hurry this step.) Remember that once established these transects are permanent. The site should be used by elk but should not be the most abused nor least used. Hollows, depressions, draws and any other site where deep snow would make the range unavailable to elk in the winter should be avoided. Numerous elk pellets are a good indication of elk usage.

3. Since the entire site is to be sampled, at least 200 or 300 feet of line transect consisting of 4 or 6 segments, each 50 feet long is needed. By using several hundred feet of line intercept in 50 foot segments, a large area of southwest exposure can be sampled. This number of segments should also minimize any variations inherent in the method.

4. Use a multiple strand wire about 1/16" in diameter and about 60 feet in length with a 2-3 inch turnbuckle attached at each end.

5. After a site for 50 feet of line has been selected, drive a steel pin of approximately ½ inch diameter and about 20 or 22 inches long into the ground until the pin protrudes about ½" or less above ground level. This is zero point of the transect. Measure exactly 50 feet with steel tape from zero pin and drive a similar pin at the 50 foot point. After driving the second pin remeasure to make sure there is just 50 feet between the two pins. (Pins can be adjusted slightly by driving small rocks into ground adjacent to pin). Pins must be firmly set to prohibit movement and in the ground far enough to avoid holding wire line up.

6. Open turnbuckles on wire line. Each man takes one end. Each man will have about 5 feet of wire beyond pin. Stretch wire over pins. Place wire directly over each pin. Pull snug. Before pulling wire snug, a pin about 3/8" in diameter and 1 foot long was passed through the ring of the turnbuckle. These are driven into the ground to hold the wire taunt. Pins may be hard to drive through rock, therefore, the extra length of wire allows the pin to be moved one way or the other until a likely spot is located at both ends. After pins are driven in and wire is fairly tight, check that it passes directly over top of each pin at zero and 50 foot point. The pins holding the wire can be moved by hammering if necessary. Walk along line and make sure it is straight and not off line by being caught on rock or brush. It helps to straighten up tall grass bent over under line. Anyone who has measured vegetation along a line knows that the closer this line is to the ground the much easier the reading. It is also faster and more accurate. However, on some rocky sites it is impossible to get the line down close to the ground. Do not bias your sample by selecting a place where the line will avoid all tall rocks _or_ by moving rocks from under the line. It should be pointed out that as little disturbance as possible should occur along the line. The turnbuckle at each end of the wire can be turned to make the wire as taunt as desired. Have the wire as close to the ground as the surface will dictate. Do not allow the pins at the zero and 50 foot points or the end pins to hold the wire up.

7. To measure the basal intercept of the vegetation two or three wooden handled dissecting pins are used to follow along the line. Starting at the zero point, follow along the steel wire with the dissecting pin held vertical. Move slowly along the line in this manner until the basal edge of a grass plant comes into contact with the dissecting pin point. Place the pin in the ground at this point. Take another pin and follow along the line on the other side of the grass plant until this pin intercepts the plants basal edge. Place second pin at this point. A 10 foot collapsible steel pocket tape graduated in feet, tenths and hundredths is used to measure the distance between the two pins. Make all measurements in hundredths of a foot. There may be numerous grasses intercepted with basal areas measuring only .01'. The basal intercept of all grass plants is recorded no matter how small the intercept. If they are less than .01' they are recorded as .01'. Record a bunchgrass plant intercepted by the line as follows: move the pin along the wire, when a bunchgrass plant is intercepted do not fuss or dig around the base or hesitate, but place the pin in the ground at the beginning of the intercept. Do likewise on the other side of the bunchgrass. If it looks like a normal plant, measure the entire intercept. Considerable discussion exists concerning the matter of interspaces in the basal area of a bunchgrass. Canfield (1942) can be followed here: "Small spots of bare ground occurring within tufts are excluded from the measurements if they are large enough to accommodate additional plants. On the other hand, barren spots which are too small to admit an additional plant are ignored, and the plant is measured as though the entire area included in the intercept were completely occupied." Hormay (1949) states it well, "the accuracy of any method of measuring vegetation rests as much upon the judgement of the observer as upon the mechanics employed."

8. What measurements are needed along the line transect on elk winter range? Grasses are the dominant plant cover on these sites and they also furnish the bulk of elk forage. The amount of basal grass cover and the grass species composition are indicative of range condition and production. Therefore it seems reasonable to confine our measurements to grass. These intercept lines, used as a tool of management, provide a fast method suitable for limited time but providing good management information. Bare ground, rock, erosion pavement and coverage of mat-like forbs can be obtained from the 2 x 5 canopy-coverage plots. However, there is reason to believe the plots underestimate bare ground as compared to the line transect. The most important bunchgrass on elk winter ranges in southwestern Montana is bluebunch wheatgrass (A. spicatum). Idaho fescue is of secondary importance. These two will be considered the key species and measured (if they occur) on all line transects. Where rough fescue occurs it will be recorded and measured separately. On some elk winter ranges the key species has all but disappeared. From adjacent areas, comparable but receiving less use, and relict areas it should be possible to determine the type of vegetation most desirable on the site. Clipping studies indicate bluebunch wheatgrass should furnish the greatest proportion of forage weight on ranges in good condition. This grass is also very sensitive to over-use especially during the growing season. Fall and winter use are least harmful. On sites where bluebunch wheatgrass has been grazed-out, other flora may expand on the ground surface due to decreased competition. Although such plants may be efficient in soil protection they are almost worthless as forage producers. On other sites bare ground, erosion pavement and undesirable grasses have replaced the bluebunch wheatgrass. On severely abused ranges it may be necessary to use certain undesirable grasses as key species. Stipa comata was abundant on an elk winter range with little if any bluebunch wheatgrass present.

All other grasses and grass-like plants excluding bluebunch wheatgrass, Idaho fescue, and rough fescue are lumped under the one heading "other grasses". Many of these grasses offer little winter elk forage. Many of the poas are completely dried up and disappear before the end of summer. In any case, any kind of a grass or grass-like plant along the line is recorded. From this standpoint it appears best to measure these transects when the grasses are easily identified, (i.e., the end of June or the first part of July). Some poas are easily confused with Idaho fescue, especially when no seed heads are present. According to Daubenmire (1940) Poa secunda is hardy, unpalatable grass, present in the climatic climax and persists through the period of deterioration and is important in the biotic climax. Under heavy use Poa secunda decreases in stature until it is a low plant with fine, wiry leaves. The fine wiry leaves of poas have caused confusion with Idaho fescue on some elk winter ranges.

It may be of some value to show a model of how to record data. Example:

Record all measurements in hundredths of a foot

All Grasses

Agsp	Feid	Fesc	Other Grasses		
.10	.12	.20	.03	.03	.01
.08	.05		.02	.02	.01
.15			.01	.01	.01
	Total Feet			Total Grass	
0.33	.17	.20	.15	0.85	
	Number of Plants				
25	10	8		10	

9. One person observes and measures the intercept while the other records. Forms are not necessary but would be helpful. A clipboard, pencils, paper, grass identification book and hand lens are required. At the top of the page record date, transect

number and length of transect, examiners, exposure, vegetative type, location, length of time to run. (It takes two men a full day to run 400 feet of line and read 40 to 100 plots. If transects have to be installed it takes longer than one day). Topographic maps are helpful on which to plot the location of transects.

10. Rocks piled at the zero and 50 foot points and painted with yellow, red or white paint facilitates transect relocation. The spray can type of paint works very well. Also install orange fence posts in an inverted position at a measured distance from the 50 foot line segments. It is not necessary to have an inverted orange fence post at each 50 feet of line. Keep all inverted fence posts well away from line transects. These posts attract animals, especially cattle as places on which to rub. They congregate and trample the vegetation of the line transect if it is too close. Place a fence post at the first 50 foot segment then whenever there is considerable distance to another 50 foot segment or it is hard to locate, use a fence post as a marker. Plot all distances and directions of transects on topographic maps and also make rough drawing showing all information for file. Numbered aluminum tags are attached with copper or aluminum wire at each 50 foot segment. Place tag on zero point. Paint zero and 50 foot point. A pliers, hammer, sledge and paint are other equipment required.

11. After a transect is established measurements can be made about once every three years. Transects should be installed in such a sequence that different ones are "read" on the site each year.

12. Calculations: When a 100 foot transect is used, the percent of ground cover is recorded as observed. To express percent ground cover for 50 feet of line the measurements are doubled. For 200 feet of line they are divided by two. The amount of bluebunch wheatgrass, Idaho fescue, rough fescue and other grasses can be expressed as a percentage of all grass coverage or all vegetation coverage. The number of grass plants along the line can also be counted. If the number of plants is divided into the total coverage for that species the average intercept can be found. With this method it is possible to compare one winter elk range with another, as to condition, especially where they are of the same climactic climax, namely bluebunch wheatgrass. If exclosures or relict areas, comparable to the site sampled are available, some idea of the "normal" is known. (Not to mean "normal" in the sense of prevailing condition but rather in the sense of climatic climax.)

In summary, the information obtainable from this method include: total basal grass coverage, total basal coverage of the key species, composition of the important grasses expressed as a percent of the total grass, the number of grass plants of each species, and the average intercept of a given species. Although the number of bluebunch wheatgrass plants do not increase or decrease at the same rate, changes in the average intercept is a sensitive indicator of range condition trend. It was also found that the number of bluebunch wheatgrass plants varies per transect but 50 per 100 feet of line appears average. Where ranges are severely abused the number of plants decrease sharply. It appears that on deteriorated ranges most of the bluebunch plants are the broken remnants of once vigorous plants.

13. One of the problems in measuring plants especially bluebunch wheatgrass along the line intercept is the lack of a clear cut definition of what constitutes a plant crown, the size of interstices within the plant that will be considered as bare ground and how to record single stemmed species. Bluebunch wheatgrass is easily identified, is conspicuous and has a well defined basal area, therefore, it should be possible to obtain accurate data for this species. However, closer uniformity among examiners will be obtained if there is less hesitancy when recording the basal crown intercept of this plant. A good, careful job without digging around the plant base is recommended. In the line intercept method we are actually measuring the plant observed and effects due to current utilization, temporary overgrazing, or short-term droughts are less apparent in

basal areas. Lines measured in October have considerably more basal grass coverage than when measured in June (i.e., there is some increase in basal cover related to season of the year). This would be much less than canopy changes during the season. Basal area is an especially important characteristic because a record of basal area measures long term effects of climatic and soil conditions and grazing.

Tables 64, 65, 66 and 67 present a condensed summary of line intercept and canopy-coverage measurements for 1965 on elk winter ranges. These should be studied for the type of information obtainable. These tables also contain data applicable to management program for the areas involved. The original field data is on file for the specific elk winter ranges involved. In another section of this report is a complete tabulation of all line intercept measurements and canopy-coverage readings.

Canopy-Coverage Plots

At the same time the line transects are measured, canopy-coverage plots are read on the same sites. The method described here has been modified from Daubenmire (1959). A frame of ¼" steel with inside dimensions of 2 x 5 dm is used for the plot. This frame should be painted with contrasting colors as a guide to estimating the coverage classes. By cutting out one end of the steel frame, work in tall forbs and brush is facilitated. See Daubenmire's paper (1959) on page 52 for a picture of how to read this frame and how to paint it. The step by step procedure follows.

1. Forty plots are sufficient in the vicinity of line intercept transects where a relatively small segment of winter range is being sampled. Where a large area of winter range is being sampled with some 300 feet of line transects, 100 plots is recommended. Since it is desirable to cover as much of the range as possible, do not read the plots along the line. Decide on a number of paces, (3 - 5) and place the frame at the end of the toe after taking that number of paces. Coverage is interpreted as a vertical projection of a polygon drawn about the undisturbed canopy, estimating separately each forage class, grass species and ground cover to be recorded. Care should be taken in reading coverage of grass inflorescences. These are relatively evanescent and should not be considered. About the only way to read grasses is to look at the grass clump and record the canopy-coverage for the main clump of the grass. It should be apparent that coverage of all taxa plus any bare ground will not equal 100 percent. The following coverages should be read at each plot location.

1. Total grass coverage.
2. Total forb coverage.
3. Total browse coverage.
4. Bare ground and erosion pavement.
5. Rock.
6. Bluebunch wheatgrass coverage.
7. Idaho fescue coverage.
8. Mat-like forbs and Selaginella.

It should be noted that 6, 7 and 8 are included in total grass and forb coverage. It is not possible to "read" A. spicatum, F. idahoensis and other grasses and then try to combine them for total grass coverage. Read all grass, all forbs, all browse and estimate bare ground (usually bare ground is under-estimated in the plots as compared to the line intercept). Erosion pavement is read with bare ground and rock is read separately. After this is done, read the amount of canopy-coverage for A. spicatum, F. idahoensis and the mat-like forbs which will include Selaginella. These mat-like forbs afford greater protection to the soil surface compared to other forb types on a deteriorated range. It is of value to make some record of elk pellets from the previous winter for each plot. This will give frequency of occurrence for pellet groups and may have comparison value between years and different winter ranges.

TABLE 64. COMPARISON OF 1965 LINE INTERCEPT INFORMATION FROM SEVERAL ELK WINTER RANGES IN SOUTHWESTERN MONTANA.

	Line Interception/100 feet						
	Agsp			Total Grass	Bare Grnd.	Rock	% Agsp
Location	Basal Intrcpt. (Ft.)	No. Plants	Ave. Intrcpt. (Ft.)	Basal Intrcpt. (Ft.)	Basal Intrcpt. (Ft.)	Basal Intrcpt. (Ft.)	of Total Grass Intrcptd.
High Rye 150' Line	5.11	43	.12	10.50			49
Devils Hole 300' Line	5.41	54	.10	12.97			42 [1]
Fleecer #300 100' Line	5.34	45	.12	17.39			31
Fleecer (Game Range) #346 200' Line	4.93	47	.10	11.74			42
Fleecer (outside exclosures) 125' Line	4.39	54	.09	10.35			42
Elk Exclosure 50' Line	5.90	58	.10	13.32			45
Elk Jump-over 75' Line	5.62	44	.13	10.40			54
Total exclosure 50' Line [2]	12.94	48	.27	22.46			58 [3]
Charcoal 350' Line	1.45 [4]	15	.09	7.53			19
Brown Can. Cr. 100' Line	1.39 [5]	44	.03	7.21			19
Toomey Cr. 300' Line	.22	7	.03	3.22	58.50	9.31	7 [6]

[1] At top of rim of Devils Hole this figure was 26%, at lowest transect off rim this figure was 60%.

[2] Total basal intercept per 100 feet of line: forbs 3.68 feet; browse 1.42 feet.

[3] 68% of the grass canopy-coverage is Agsp in the total exclosure. (about 70% of the grass canopy-coverage was Agsp inside the elk jump-over)

[4] The basal intercept of Feid per 100 feet of line was 2.10 feet.

[5] The basal intercept of Feid per 100 feet of line was 5.04 feet.

[6] Feid accounted for 25 percent of the total grasses intercepted.

TABLE 65. COMPARISON OF 1965 CANOPY-COVERAGE INFORMATION FROM SEVERAL ELK WINTER RANGES IN SOUTHWESTERN MONTANA.

			Canopy-Coverage				Mat-Like
	Agsp	Grass	Forbs	Browse	Bare Grnd.	Rock	Selg.& Plants
	%	%	%	%	%	%	%
Location	Ave. / Freq. Cov.	Ave. Cov.	Ave. Cov.	Ave. Cov.	Ave. Cov.	Ave. Cov.	Cov.
High Rye 40 Plots	15/73	33	8	0	11	13	
Devils Hole 60 Plots	16/80	44	12	0	21		
Fleecer #300 40 Plots	12/78	28	28	0	18		
Fleecer (Game Range) #346 50 Plots	18/94	35	37	TR			
Fleecer (outside exclosures) 80 Plots	18/94	33	30	2	24		
Elk Exclosure 40 Plots	13/90	28	26	0	18		
Elk Jump-over 40 Plots	24/93	34	24	0	22		
Total Exclosure 40 Plots	49/100	72	31	TR	9		
Charcoal 130 Plots	4/43	19	12 1/	TR	9	15	31
Brown Can. Cr. 40 Plots	7/68	14	18	0	36 2/		
Toomey Cr. 100 Plots	1/28	8	13	2	49	13	
Squaw Creek 100 Plots 3/	3/35	16	12	TR	53	9	

1/ Does not include mat-like plants.

2/ In 1964, 53.75 feet per 100 feet of line was erosion pavement in Browns Can. Cr. while on Charcoal in 1964 only 8.89 feet per 100 feet of line was bare ground and erosion pavement. On Charcoal in 1964, rock amounted to 19.95 feet per 100 feet of line.

3/ 19% of the total grass canopy-coverage was Agsp.

TABLE 66. PERCENT FORAGE CLASS COMPOSITION ON VARIOUS ELK WINTER RANGES.

	From Canopy-Coverage Plots			From Basal Intercept		
Location	Grass	Forbs	Browse	Grass	Forbs	Browse
High Rye	81	19	0			
Devils Hole	79	21	0			
Fleecer #300	50	50	0			
Fleecer #346	49	51	0			
Outside Exclosures	51	46	3	50	48	2
Elk Exclosure	52	48	0	52	48	TR
Elk Jump-Over	59	41	0	45	55	0
Total Exclosure	70	30	TR	82	13	5
Charcoal	61	39	TR			
Browns Canyon Cr.	44	56	0			
Toomey Creek	36	56	8			
Squaw Creek	56	43	1			

TABLE 67. A COMPARISON OF 1965 BASAL INTERCEPT INFORMATION FROM TEN 50' TRANSECTS. FLEECER MOUNTAIN AREA 1/

	Per 100 Feet of Line Intercept				
Location	Basal Intrcpt Agsp (Ft.)	Basal Intrcpt Total Grass (Ft.)	% Agsp	No. Agsp Plants	Ave. Agsp Intrcpt Ft.
Fleecer #367	6.52	11.18	58	44	.15
Fleecer #366	6.80	12.18	56	54	.13
Devils Hole #374	6.82	15.16	45	60	.11
High Rye #377	7.14	9.92	72	38	.19
Devils Hole #375	8.84	14.92	59	50	.18
Fleecer-Total Exclosure	12.94	22.46	58	48	.27
Brown Can. Cr. #379	.82	6.44	13	32	.03
Charcoal #344	.64	7.46	9	12	.05
Toomey Creek #385	.24	2.38	10	10	.02
Toomey Creek #382	.18	2.88	6	10	.02
Toomey Creek #380	.00	3.24	0	0	-
Fleecer-Elk Jump-over #369 25' Line	7.92	12.32	64	52	.15
Outside Jump-over #369 25' Line	4.28	9.20	47	60	.07

1/ The above data is a comparison of information from five transects with the greatest basal Agsp coverage with that from five transects of least basal Agsp coverage. Information from the cattle-elk exclosure transects in the Fleecer area is also presented.

The six coverage classes with their ranges of value, and the mid points used in calculations are:

	Percent Coverage	
Class	Range	Mid Point
1	0 - 5	.025
2	5 - 25	.150
3	25 - 50	.375
4	50 - 75	.625
5	75 - 95	.850
6	95 - 100	.975

Coverage classes are recorded in the field for each of the above forage classes, grasses and ground cover. In subsequent calculations of average coverage for the series of plots, the mid point of each class is used.

From this method we can obtain canopy-coverage, frequency of occurrence, composition of the forage classes and grasses expressed as a percent. A point in favor of canopy-coverage as compared to basal area is that it is more closely related to forage availability to grazing animals. The amount of canopy-coverage of course, will vary during the growing season. In most plant communities the taxa attain their maximal seasonal development at different times. That is, canopy-coverage will vary with the stage of growth and weather differences between years. Basal area evaluations can be made over a longer season with less variation than is possible with canopy-coverage.

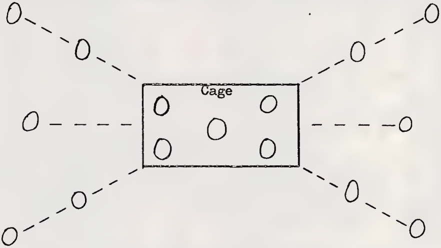
Herbage Clipping

This method places emphasis on forage production and utilization. Agronomy cages placed on the elk winter range in the vicinity of the transects make it possible to obtain figures on grass production, and utilization by cattle and elk. Because of the small sample size selecting the site for the cage is very important. On winter ranges not used by cattle, fall clipping will indicate total production. No cage is necessary. The site can be clipped again in the spring for winter elk utilization. The usual situation is for cattle to use elk winter ranges during the summer, often severely. Agronomy cages and clipping outside indicates cattle use when these sites are clipped in the fall. There are two advantages to clipping. It is possible to determine the amount of grass herbage used by cattle on elk winter ranges and secondly, determine a production figure expressed in lbs. per acre for grass herbage produced on elk winter ranges. Recording bluebunch wheatgrass separately gives valuable information on range condition. Daubenmire (1940) states bluebunch wheatgrass contributed 85 percent of the annual forage output in a community he studied. This is the procedure used for clipping.

1. Selection of cage site is very important. If a person does not know how to select a site no volume of directions here will be of any value.

2. On elk winter ranges used by cattle during the summer the plots are clipped after the cattle leave in the fall. Elk range not used by cattle can be clipped in the fall after growth ceases. Spring clipping is not recommended.

3. Five .96 sq. ft. plots are clipped inside each cage and ten .96 sq. ft. plots are clipped outside each cage. It is desirable to have several agronomy cages on each elk winter range site. This lay-out has been used.



Cattle and elk frequently trample the area adjacent to the cages, therefore it is recommended these areas be avoided for clipping samples. On elk winter range not used by cattle, adequate sample sites can be located by pacing off a definite number of steps and laying the circle at the end of the toe.

4. All grass and grass-like plants are clipped to ground level. Clip all A. spicatum to ground level and put into a separate sack. Clip all the other grass and grass-like plants to ground level and put into another sack. Weigh these grasses only after they are completely air dried. Subtract the weight of the sack.

$$\underset{\text{(in grams)}}{\text{Avg. wt.}} \quad .96 \text{ Plot} \times 100 = \underset{\text{(Air dry wt.)}}{\#/\text{Acre}}$$

$$\text{Net caged weight} - \text{Net grazed weight} = \text{Weight used}$$

$$\frac{\text{Weight Used}}{\text{Net caged weight}} \times 100 = \text{Percent used.}$$

5. Clipped plots enable an evaluation of the condition of the key species, trend in forage production of all grass and the key species, cattle and elk utilization and total production. The amount of grass left after utilization to maintain the plant

community and protect the soil can also be determined.

Elk winter ranges in much of this district should be producing about 1200 pounds dry weight of grass herbage annually and bluebunch wheatgrass should furnish about 70 percent or more of this weight.

Percent of Plants Grazed Method

There are many grazed plant transects on elk winter ranges in southwestern Montana. These should be "read" in the fall after cattle leave and again in the spring after elk leave, using bluebunch wheatgrass and Idaho fescue as the key species. One way to employ this method involves walking completely over the elk winter range site. The observer carries two counters, one for recording grazed plants and the other for ungrazed plants. At predetermined intervals (steps) the proper counter records whether a bluebunch wheatgrass plant is grazed or ungrazed. No effort is made to sample a certain number of plants only the number or percent of grazed and ungrazed plants. As many as a thousand plants may be observed and their status (grazed or ungrazed) recorded. The numbered transect serves only to locate the site of this particular survey method. The primary objective is an inspection of the entire site to gain some knowledge of the degree of utilization. A plant should be conspiciously grazed in order to be classed as such. In reporting this information, show the percent of plants grazed and the average height of the remaining stubble.

Prepared by: Joseph L. Egan

Approved by: Wynn G. Freeman

Date: April 1967

APPENDIX 1. NOTICE OF ELK SEASON

By order of the Montana Fish and Game Commission, the following described area in Park County shall be open to the hunting of elk by permit holders only on January 26 and 27, 1963. This same area shall be open to the hunting of elk to any holder of a valid big game license with elk tag attached from January 28 through February 28, 1963. Shooting hours shall be from one-half hour before sunrise until one-half hour after sunset each day.

Area 1 - Beginning at the confluence of Mol Heron Creek with the Yellowstone River, thence southwesterly up Mol Heron Creek to the Yellowstone National Park boundary, thence easterly along said boundary to the Yellowstone River, thence in a northerly direction along said river to the confluence of Mol Heron Creek, the point of beginning.

Area 2 - Gardiner North - beginning at the Yellowstone National Park boundary on the divide between Crevice, Cottonwood, and Hellroaring Creeks, thence northerly along said divide to Ash Mountain, thence northwesterly along the Hellroaring-Mill-Bear Creeks divide to Monitor Peak, thence southwest along the Cedar-Bear Creeks divide to Sheep Mountain, thence southerly along the Little Trail-Bassett-Maiden Basin divide to Little Trail Creek - this excludes Maiden Basin - thence southerly along Little Trail Creek to Highway No. 89, thence southeasterly along Highway No. 89 to the Yellowstone Park boundary, thence east along said boundary to the Crevice, Cottonwood and Hellroaring Creeks divide, the point of beginning.

800 either sex elk permits will be issued according to the following rules: Each applicant must be a holder of a valid 1962 Big Game License with elk tag attached and must be present to participate. Drawings will be conducted at the locations listed below on Thursday, January 24, 1963. Registration will start at 4:00 p.m. and the drawings will be held at 8:00 p.m.

Kalispell District Fish & Game Headquarters, Missoula District Fish & Game Headquarters, Butte-Silver Bow County Courthouse, Bozeman District Fish & Game Headquarters, Great Falls District Fish & Game Headquarters, Billings District Fish & Game Headquarters, Glasgow District Fish & Game Headquarters, and Miles City District Fish & Game Headquarters.

75 permits will be issued at each location.

The final drawing will be held Friday, January 25, 1963 at the Civic Center in Livingston. Registration will begin at 4:00 p.m. and the drawing will be held at 8:00 p.m. 200 permits will be issued at this drawing plus any additional permits that are not issued at the drawings listed above.

APPENDIX 2. SPECIAL GARDINER ELK SEASON

By order of the Montana Fish and Game Commission, the following described areas in Park County shall be open to the hunting of elk and shall be governed by the regulations listed below:

Area No. 1 - Gardiner: That portion of Park County lying within the following described boundary: Beginning at the Yellowstone National Park boundary at Gardiner, thence east along said boundary to the divide between Crevice, Cottonwood and Hellroaring Creeks, thence northerly along said divide to Ash Mountain, thence northwesterly along the Hellroaring-Mill-Bear Creeks divide to Monitor Peak, thence southwest along the Cedar-Bear Creeks divide to Sheep Mountain, thence southerly along the Little Trail-Bassett-Maiden Basin divide to Little Trail Creek, thence westerly down Little Trail Creek to the Yellowstone River, thence down the Yellowstone River to the mouth of Mol Heron Creek, thence up Mol Heron Creek to the Yellowstone National Park boundary, thence east along said boundary to the town of Gardiner, the point of beginning.
NOTE: This is District 313 as described on the 1964 Deer, Elk and Bear seasons map.

Area No. 2 - Corwin Springs-Six Mile: That portion of Park County lying within the following described boundary: Beginning at the confluence of Six Mile Creek with the Yellowstone River, thence southerly up the main fork of Six Mile Creek, thence up Six Mile Creek to Monitor Peak, thence westerly along the divide between the north fork of Bear Creek and Cedar Creek to Sheep Mountain, thence southerly along the Little Trail-Bassett-Maiden Basin divide to Little Trail Creek, thence westerly down Little Trail Creek to the Yellowstone River, thence northerly down the Yellowstone River to Six Mile Creek, the point of beginning.

REGULATIONS: 1. Area No. 1 shall be open to the hunting of either sex elk by special permit holders one-half hour before sunrise February 6, 1965 until one-half hour after sunset on February 7, 1965.

2. Area No. 2 shall be open to the hunting of antlered bull elk only by special permit holders one-half hour before sunrise February 6, 1965 until one-half hour after sunset on February 7, 1965.

3. Area No. 1 shall be open to the hunting of either sex elk from one-half hour before sunrise February 8, 1965 to one-half hour after sunset February 21, 1965. Any person possessing a valid unused 1964 elk tag shall be eligible to hunt.

4. Area No. 2 shall be open to the hunting of antlered bull elk only from one-half hour before sunrise February 8, 1965 to one-half hour after sunset February 21, 1965. Any person possessing a valid unused 1964 elk tag shall be eligible to hunt.

5. 550 special elk licenses valid from one-half hour before sunrise February 6, 1965 until one-half hour after sunset February 7, 1965 in either Area 1 or Area 2 will be issued in the following manner: A drawing will be held in each of the following locations and permits will be issued as follows:

100 special elk permits will be issued at the Civic Center in Livingston.
50 special elk permits will be issued at each of the following Fish and Game District Headquarters: Kalispell, Missoula, Bozeman, Great Falls, Billings, Glasgow and Miles City.
50 special elk permits will be issued at the County Courthouse in Butte.
50 special elk permits will be issued at the Eagles Hall in Gardiner.

Registration for each of these drawings will start at 4:00 p.m. on February 4 and the drawing will be held at 8:00 p.m. February 4, 1965.

APPENDIX 2 - CONTINUED.

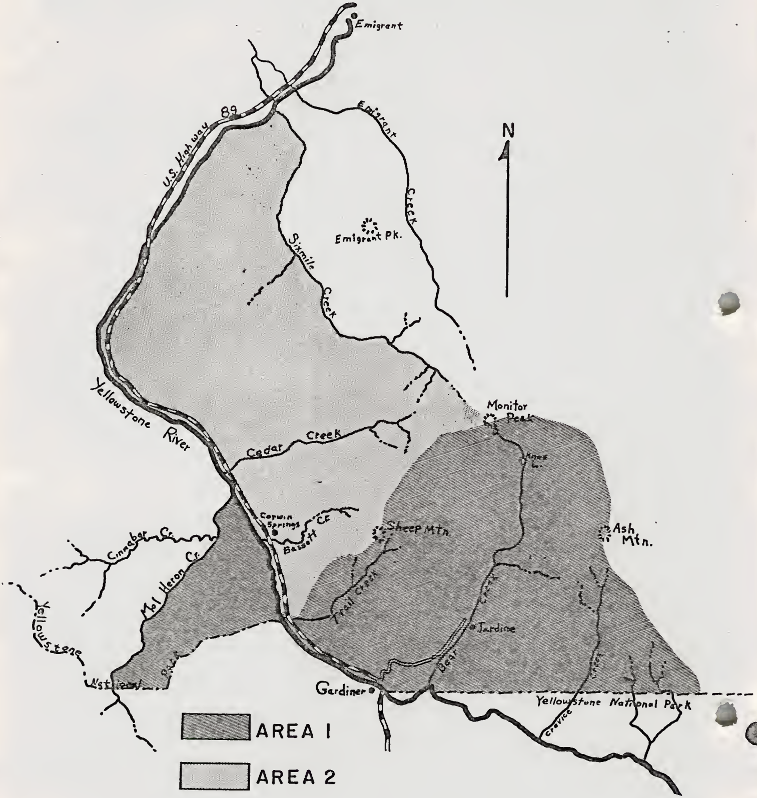
6. Only persons with unused 1964 elk tags will be eligible to apply, and applicants must be present at the time of drawing to be eligible.

7. All elk hunting will close one-half hour after sunset on February 21, 1965 but may close on 48 hours notice in the event the desired harvest is reached.

8. Hunting will be in conformance with regulations adopted by the Montana Fish and Game Commission governing the 1964 Deer, Elk and Bear seasons. Shooting hours will be one-half hour before sunrise until one-half hour after sunset each day.

APPENDIX 3

SPECIAL GARDINER ELK SEASON 1965



APPENDIX 4. GARDINER ELK SEASON CLOSURE

By order of the Montana Fish and Game Commission, the following described areas in Park County shall be closed to the hunting of elk effective one-half hour after sunset February 13, 1965.

Area No. 1 - Gardiner: That portion of Park County lying within the following described boundary: Beginning at the Yellowstone National Park boundary at Gardiner, thence east along said boundary to the divide between Crevice, Cottonwood and Hellroaring Creeks, thence northerly along said divide to Ash Mountain, thence northwesterly along the Hellroaring-Mill-Bear Creeks divide to Monitor Peak, thence southwest along the Cedar-Bear Creeks divide to Sheep Mountain, thence southerly along the Little Trail-Bassett-Maiden Basin divide to Little Trail Creek, thence westerly down Little Trail Creek to the Yellowstone River, thence down the Yellowstone River to the mouth of Mol Heron Creek, thence up Mol Heron Creek to the Yellowstone National Park boundary, thence east along said boundary to the town of Gardiner, the point of beginning.

NOTE: This is District 313 as described on the 1964 Deer, Elk and Bear seasons map.

Area No. 2 - Corwin Springs-Six Mile: That portion of Park County lying within the following described boundary: Beginning at the confluence of Six Mile Creek with the Yellowstone River, thence southerly up the main fork of Six Mile Creek, thence up Six Mile Creek to Monitor Peak, thence westerly along the divide between the north fork of Bear Creek and Cedar Creek to Sheep Mountain, thence southerly along the Little Trail-Bassett-Maiden Basin divide to Little Trail Creek, thence westerly down Little Trail Creek to the Yellowstone River, thence northerly down the Yellowstone River to Six Mile Creek, the point of beginning.

APPENDIX 5. NOTICE OF SPECIAL ELK SEASON

By order of the Montana Fish and Game Commission, the following described areas in Gallatin and Madison Counties shall be open to the hunting of elk of either sex by special elk permit holders only, under the following regulations.

AREA DESCRIPTIONS:

Area No. 1 - Porcupine-Elkhorn Creeks: Beginning at the mouth of Buffalo Horn Creek, thence up the main Buffalo Horn Creek to Ranshorn Peak, thence northerly along the Gallatin River-Yellowstone River divide to Eaglehead Mountain, thence northwesterly along the divide lying between Porcupine Creek and Portal-Levinski Creeks to the West Gallatin River, thence up the West Gallatin River to the mouth of Buffalo Horn Creek, the point of beginning.

Area No. 2 - Lodgepole-Tepee Creek: Beginning at the mouth of Sage Creek, thence up Sage Creek to Canyon Creek, thence up Canyon Creek to Monument Mountain, thence northeasterly along the West and North divide of Monument Creek drainage down to the Yellowstone National Park boundary near Lava Butte, thence northwesterly and northeasterly along said Yellowstone National Park boundary to the Gallatin River-Yellowstone River divide, thence northerly along said divide to Ramshorn Peak, thence down the main Buffalo Horn Creek to the West Gallatin River, thence southerly up the West Gallatin River to Sage Creek, the point of beginning.

Area No. 3 - Taylors Fork: Beginning at the mouth of Buck Creek, thence up Buck Creek to the Madison River-West Gallatin River Divide, thence in a southerly and easterly direction along said divide to Lookout Point, thence easterly and northerly down Sage Creek to the West Gallatin River, thence in a northerly direction down said river to the mouth of Buck Creek, the point of beginning.

REGULATIONS:

(1) 1,000 special either sex elk permits and 1,000 alternate special elk permits will be issued. In the event that the desired harvest is not obtained by the 1,000 special elk permit holders, alternate permittees will be allowed to hunt by weekly groups.

(2) Applicants must have a valid 1964 big game license with elk tag attached.

(3) Application may be made by first class letter to the Montana Fish and Game Department, Helena, Montana. The application must be postmarked not later than midnight December 18, 1964. The application must contain the name, address and the number from the applicant's unused 1964 elk tag.

(4) If the number of applicants exceeds 1,000, a drawing will be held at 10:00 a.m. December 22, 1964 at the Fish and Game Department Headquarters, Helena, Montana.

(5) The special elk permits will be issued to successful applicants in the following manner:

    (a) A total of 100 permits will be issued for Area No. 2 (described above) and will be valid from ½ hour before sunrise on December 27, 1964 until 3:00 p.m., M.S.T. January 1, 1965.

    (b) An additional 225 permits will be issued and will be valid for one of the three areas (descrived above) for each of the first four open season periods shown below.

(c) In addition, 200 alternate permits will be issued for one of the three areas (described above) for each of the open season periods 5 through 9 shown below. In the event that the desired harvest is not obtained by special permit holders, the alternate permitees will be allowed to hunt by weekly periods.

TIME PERIODS

	Open	Closed
1.	December 30	January 5
2.	January 2	January 8
3.	January 6	January 12
4.	January 9	January 15
5.	January 13	January 19
6.	January 16	January 22
7.	January 20	January 26
8.	January 23	January 29
9.	January 27	January 31

(6) Successful applicants with permits or alternate permits issued for any period from January 2, 1965 on must have their special permits validated and a hunting area assigned at one of the following checking stations before they may legally hunt:

Checking Station 1: located on U.S. Highway 191, approximately 6 miles north of Gallatin Gateway, Montana.

Checking Station 2: located on U.S. Highway 191 near the mouth of Snow Slide Creek.

(7) It shall be unlawful for any person to kill more than one elk during any license year.

(8) This elk season may close on 2 days notice if the quota of 1,000 elk is achieved before all permits or alternate permits have been validated.

(9) All areas are for elk of either sex.

(10) All successful hunters must have their elk checked by attendants at either of the two 24-hour Montana Fish and Game checking stations located at the mouth of Gallatin Canyon and on Highway 191 south of the West Gallatin-Grayling Creek divide.

(11) Hunting regulations for the Special Upper Gallatin Elk Season are the same as those adopted by the Montana Fish and Game Commission for the 1964 Big Game Season with the following EXCEPTIONS: Daily hunting hours in Area 2 are from one-half hour before sunrise until 3:00 p.m., M.S.T.

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639.9
W-73-R-11
A-1 (ELK)

STATE DOCUMENTS

1965

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT

State of Montana	Name Wildlife Investigations - District Three
Project No. W-73-R-9-10-11	Title Big Game Surveys and Investigations -
Job No. A-1	Elk Studies (Madison-Wall Creek Unit)

Period Covered: July 1, 1963 to June 30, 1965

ABSTRACT:

Information on location, utilization and condition of elk winter ranges in Area 33, with emphasis on the Wall Creek area is presented. Methods used to determine range condition and utilization include Daubenmire plots, square meter plots, percent of grazed plants, agronomy cages and exclosures. Data suggests that parts of the range in the Wall Creek area are being over-utilized with livestock contributing to most of the problem. A copy of the joint Forest Service and Fish and Game agreement for this area is included. Other data includes information on soils, elk census, seasons and harvest, domestic livestock allotment criteria and description and history of the study area. Recommendations for management are included.

OBJECTIVES:

The objectives are to obtain specific information on the elk inhabiting the vicinity of Wall Creek Game Range, with special emphasis on movement patterns, livestock relationships and differential vulnerability to hunter harvest. This is only one facet of a continuing study incorporated into routine investigations. Work is to progress without benefit of a specific timetable.

FINDINGS:

This report summarizes past and present management of the Madison-Wall Creek elk herd. As a part of the Gravelly-Snowcrest complex elk populations, this herd has become a well-known and increasingly important one from the sportsman's viewpoint. Other factors contributing to its importance are: (1) the herd winters, in part, on the Madison-Wall Creek Game Range which is owned by the Montana Fish and Game Department; (2) a major portion of the winter range is on National Forest land which is also used by livestock; (3) adjacent landowners express concern over elk depredations to private land and over future management of this elk herd.

The winter range lies west of the Madison River about 26 miles south of Ennis (Figure 1). It occupies the foothill area of the east slopes of the Gravelly Range from Horse Creek north to Ruby Creek. The lower grassland and sagebrush areas generally extend upward on the slopes which, as they become steeper, support aspen stands and conifer timber. Annual rainfall is 10-14 inches. The main portion of this area is within the Beaverhead National Forest with smaller portions owned by the Fish and Game Department, Andrew Kelly, Peter Durham, Alden Frisbie and William Armitage.

The Fish and Game Department acquired the W. D. Holt and Sons property, about 7000 acres, in 1960 for elk winter range and fishing access purposes. Adjacent Bureau of Land Management lands were withdrawn for recreational purposes. Nine-hundred sixty acres of state land were leased by the Fish and Game for these same purposes.

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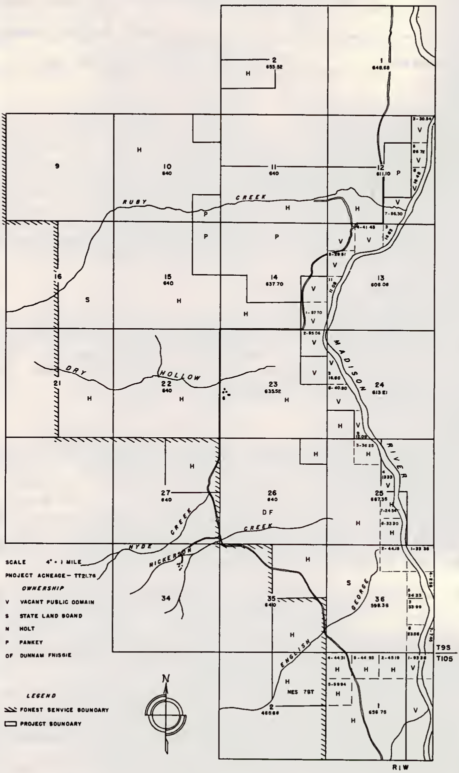
Figure 1. MADISON, WALL CREEK ELK WINTER RANGE.

MADISON COUNTY, MONTANA



MONTANA FISH & GAME DEPARTMENT
HELENA, MONTANA

October 20, 1960

The acquisition is locally known as the Holt Ranch after its previous owners.

Past Department records suggest an increase in elk populations occurred in this area from the 1940's and early 1950's through the early 1960's. This information is presented on Table 1 for the Wall Creek area and in Appendix I and II for the Gravelly-Snowcrest.

Local ranchers have complained of elk depredations to private rangeland and haystacks since the early 1950's.

Hunting seasons for management Area 33 (Table 2) have been characterized by short either-sex seasons since 1950. The 1955 season was for 14 days, antlered bulls, with 320 either-sex permits issued. The 1956 and 1957 seasons were seven days of either-sex. The 1958 season was for antlered bulls only. The 1959, 1960 and 1961 seasons were for about 20 days antlered bulls with either-sex the last two days of the season. The 1962 season opened with three days either-sex and was followed by 33 days of antlered bull hunting. The 1963 and 1964 seasons were open to antlered bulls; and the 1965 season, to branch antlered bulls. The accessible characteristics of the majority of the Gravelly-Snowcrest complex have been major factors influencing formulation of hunting seasons.

Checking station information collected during the either-sex season of 1962 revealed differential vulnerability levels to hunting among the various elk populations in Area 33. Of the 616 elk checked through the five stations, only fifteen came from the Wall Creek area. Four-hundred twenty came from the Ruby-Blacktail area, 158 from the West Fork Madison area, and 23 from the Madison area north of Ruby Creek. Although the information indicated favorite elk hunting areas and to a large degree where the bulk of the entire elk population was thought to be during the season, it also would suggest that the Wall Creek area was not hunted intensively. The Wall Creek portion is less accessible to vehicle travel than most other parts of the Area 33.

TABLE 1. Summary of Elk Census, 1947-1964 on Wall Creek Area.

Year	Number Seen	Remarks
1947 1/	90	Wall Creek Area
1950	158	Includes West Fork of Madison
1951	80	Madison drainage
1957	88	Includes all of Madison drainage in Management Area 33
1958	249	Includes all of Madison drainage in Management Area 33
1959	193	Includes all of Madison drainage except West Fork of Madison
1962	256	Wall Creek Area
1963	189	Wall Creek Area
1964 2/	340	

1/ 1947 data obtained from ground; other data obtained by aerial census.

2/ See Table 22, Job Completion Report, W-73-R-8-9-10, Job A-1, "Elk Surveys and Investigations."

TABLE 2. Seasons and Harvest on elk in Gravelly-Snowcrest Centennial, Area 33.

Year	Season	Harvest Checking Station	 Questionnaire
1948	Closed		
1949	3-Day, either sex (Only Blacktail open)	600	
1950	3-Day, either sex	1063	
1951	2 Days bulls; 1 Day either sex	90 1/	
1952-1954	No Data		
1955	320 Permits, either sex; antlered bulls - 2 weekends		
1956	Either sex until closed (closed within 7 days)	850	
1957	7 Days either sex	600	1007
1958	Antlered bulls only		325
1959	3 Weeks bulls; 2 days either sex		1180
1960	3 Weeks bulls; 2 days either sex		850
1961	3 Weeks bulls; 2 days either sex		900
1962	3 Days either sex; 4 weeks bulls	616	1424
1963	Antlered bulls, 5 weeks		187
1964	Antlered bulls, 5 weeks		255

1/ Inclement weather prevailed.

Production in this herd has been excellent in recent years. Cow-calf ratios of around 100:60 have been observed.

Evaluation of the Wall Creek winter range was initiated in 1961. The problems of distinguishing between elk utilization and cattle utilization and of determining the specific "key" elk wintering areas were recognized.

Since elk-cattle competition is a major consideration on this area, the following information is provided on livestock grazing upon National Forest land in the Wall Creek area. The information was provided by the Madison District Ranger. National Forest land encompassed within the general area about Wall Creek is presently grazed by 694 cattle belonging to eight ranchers. The ranchers are organized into the Wall Creek Stock Association for administrative purposes. The Wall Creek allotment consists of seven units based on drainage areas, of which six are considered at least in part spring cattle range (Table 3).

The Ruby Creek unit is deferred from cattle grazing. The Johnny Gulch unit, north of Ruby Creek, and the Horse Creek units were grazed from June 16 to October 15 in 1963 and 1964. In 1965, the cattle were permitted on the forest on June 21. The Dry Hollow, Nickerson and English George units are grazed from June 16 to August 1 with cattle being moved to the Wall Creek and Hyde Creek basins at higher elevations on August 1 and remaining until October 15. A rider is employed to check distribution and condition of cattle during the grazing season.

A waiver of grazing preferences for 311 cattle by the Forest Service from this allotment occurred in 1961 when the Fish and Game purchased this base property (Appendix III

Various adjustments in grazing seasons and stocking rates have occurred within this allotment during past years. In general, range condition and trend studies made by the Forest Service on this allotment indicate improving range conditions for cattle.

A Soil Conservation Service soil survey of the W. D. Holt and Sons property was made in 1951 (Figure 2). Twenty-six of forty-five soil sites examined were less than 20 inches deep, 19 were over 20 inches (Table 4). The major share of upland sites contained the shallower soils. In general, soils were alkaline, medium textured, moderate in porosity, and originated from alluvial deposits. Erosion amounted to less than one fourth of the top soil in most areas. The range information listed in this survey was obtained from the upland soil sites.

Grazing capacities on certain parts of the Wall Creek Game Range and certain adjacent properties were determined by the Soil Conservation Service in September, 1964. This determined animal unit month capacities for certain portions of Sections 23, 24 and 25, R1W T9S. Six hundred and nine acres were surveyed on the game range in the above-named sections and a rate of 0.2 AUM's [1] per acre was deemed proper for these acres. The total calculated AUM's for these 609 acres was 121.8. A similar determination was made on the Andrew Kelly property lying in Sections 11, 12, 13 and 14, R1W T10S for 548 acres. The Soil Conservation Service determined that 0.3 AUM's per acre was proper on these acres. It was calculated that there were 164.4 AUM's on the 548 acres.

Table 5 lists types of studies initiated on the winter range by the Fish and Game and Figure 3 shows locations. Of these surveys, five consist of square meter plots established on Game Range land on areas not necessarily considered "key" elk winter range, but on which specific data were thought to be helpful in determining present condition of these areas, and also of help in accumulating range information for the whole area. Ten other surveys consist of transects of 40, two by five decimeter plots each, established on slopes and ridges which may be considered "key" elk winter range. The canopy-coverage method (Daubenmire 1959) was used to secure data. The information is summarized in Appendix IV.

The following criteria were established to provide a basis for interpreting the information. Canopy coverage and frequency data were obtained for each species within the study area. Species were then classified into either tall grass, mid-short grass, or moss-lichen unions. Table 6 lists all species found within the study areas by union and desirability class. The classification is considered as a base against which current data may be evaluated until information from subsequent studies may be considered. The standard Forest Service scorecard dated March 1958, Coupland (1961), Evanko and Peterson (1955) was selected as bases for the desireability classification. Elk food habits studies (Rouse 1957, Kirsch 1962) were also used to help evaluate certain species, especially early season forbs which, as part of the native climax vegetation, may perhaps be decreasers under spring grazing by elk. These food habits studies suggested that early spring grazing by elk was confined largely to the early season grasses with increasingly greater proportions of forbs (Myosotis, Aster, Agoseris, etc.) occurring in the diet as they emerged.

The data are expressed as separate canopy coverage/frequency percentages for each species, for each union, and for each desirability class. Data may be compared by species and by union within each desireability class and also by desireability classes. The percentages will not add to 100 as the method may cause overlap in canopy coverage for any two or more given species, especially among unions, but also within each union.

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[1] Animal unit month.

TABLE 3. Cattle Grazing Units within the Wall Creek allotment, Beaverhead National Forest, showing 1963, 1964, 1965 grazing season stocking.

First Unit	Number Cattle	Grazing Period	Second Unit	Number Cattle	Grazing Period	Third Unit	Number Cattle	Grazing Period
1963								
Johnny Gulch	150	6/16-10/15						
Ruby Creek	deferred							
Dry Hollow	50	6/18-8/1	Wall Creek & Hyde Creek	494	8/1-10/15			
Nickerson Creek	220	6/18-8/1						
English George	224	6/18-8/1						
Horse Creek	50	6/16-10/15						
1964								
Johnny Gulch	150	6/16-10/15						
Dry Hollow	89	6/16-7/20	Ruby Park	89	7/20-9/1	Ruby Creek	89	9/1-10/15
Nickerson Creek	181	6/16-7/20	Wall Creek & Hyde Creek	405	7/20-10/15			
English George	224	6/16-7/20						
Horse Creek	50	6/16-10/15						
1965								
Johnny Gulch	150	6/21-10/15						
Dry Hollow	89	6/21-7/20	Ruby Park	89	7/20-10/15			
Nickerson Creek	181	6/21-7/20	Wall Creek & Hyde Creek	405	7/20-10/15			
English George	224	6/21-7/20						
Horse Creek	50	6/21-10/15						

FIGURE 2. Soil map of Wall Creek Game Range, modified after a Soil Conservation Service soil survey of 1951.

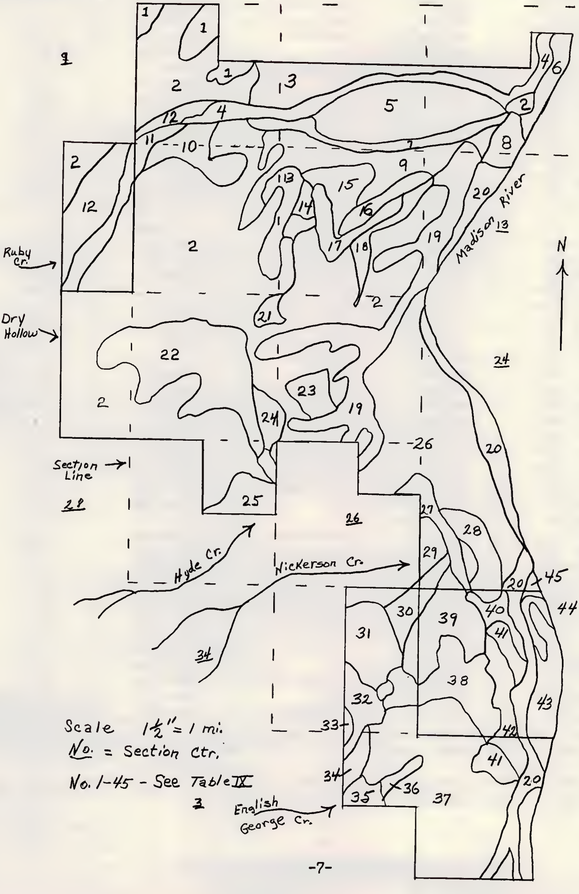

TABLE 4. Key to Soils Map (Fig. 2), Madison-Wall Creek Game Range.

No.	Soil Depth	Texture	Porosity[1]	Parent Material	Degree of Erosion[2]
1	20" - 36"	medium	moderate	shale	1/4
2	under 10"	medium	moderate	shale	1/4
3	10" - 20"	medium	moderate	alluvium	1/4
4	10" - 20"	mod-heavy		alluvium	1/4
5	20" - 36"	medium	moderate	shale	1/4
6	10" - 20"	medium		gravel	1/4
7	20" - 36"	gravelly	moderate	alluvium	1/4
8	10" - 20"	very light	moderate	gravel	1/4
9	10" - 20"	medium	moderate	alluvium	1/4
10	10" - 20"	medium	moderate	shale	1/4
11	10" - 20"		moderate	gravel	1/4
12	under 10"	medium	moderate	shale	1/4
13	36" - 60"	medium	mod-rapid	alluvium	1/4
14					
15	20" - 36"	medium	mod-rapid	alluvium	1/4
16	10" - 20"	light	slow-mod.	alluvium	1/4
17	20" - 36"	medium	moderate	gravel	1/4
18	20" - 36"	medium	moderate	gravel	1/4
19	10" - 20"	medium	mod-rapid	alluvium	1/4
20	10" - 20"	medium	moderate	gravel	1/4
21					
22	10" - 20"	light	slow-mod.	shale	1/4
23	36" - 60"	medium	moderate		1/2
24	20" - 36"	medium	rapid	gravel	1/2
25	10" - 20"	medium	moderate	gravel	1/4
26	under 10"	medium	moderate	gravel	1/4
27	10" - 20"	medium	mod-rapid	gravel	1/4
28	20" - 36"	medium	moderate	gravel	1/4
29	20" - 36"	medium	moderate	gravel	1/4
30	36" - 60"	medium	mod-rapid	alluvium	1/4
31	36" - 60"	mod-heavy	mod-rapid	alluvium	1/4
32	under 10"	moderate		alluvium	1/4
33	under 10"	moderate		alluvium	1/4
34	10" - 20"	medium	moderate	alluvium	1/4
35	under 10"	medium		alluvium	1/4
36	36" - 60"	medium	mod-rapid	alluvium	1/4
37	10" - 20"	medium	moderate	alluvium	1/4
38	36" - 60"	medium	moderate	alluvium	1/4
39	36" - 60"	medium	mod-rapid	alluvium	1/4
40	10" - 20"	medium	mod-rapid	alluvium	1/4
41	20" - 36"	medium	moderate	alluvium	1/4
42	under 10"	medium		alluvium	1/4
43	20" - 36"	medium		alluvium	1/4
44	under 10"	medium		gravelly	1/4
45	36" - 60"	medium	moderate	gravelly	1/4

[1] Porosity:rate per hour at which water passes through saturated subsoil layers. Moderate - 0.80 to 2.5", slow-moderate - 0.20-0.80", moderate-rapid - 2.50 - 5.00", rapid 5.00 - 10.00".

[2] Erosion - 1/4 - less than one/fourth of topsoil removed. 1/2 - one fourth to three fourths of topsoil removed.

FIGURE 3. Locations of study areas - Wall Creek Game Range vicinity.

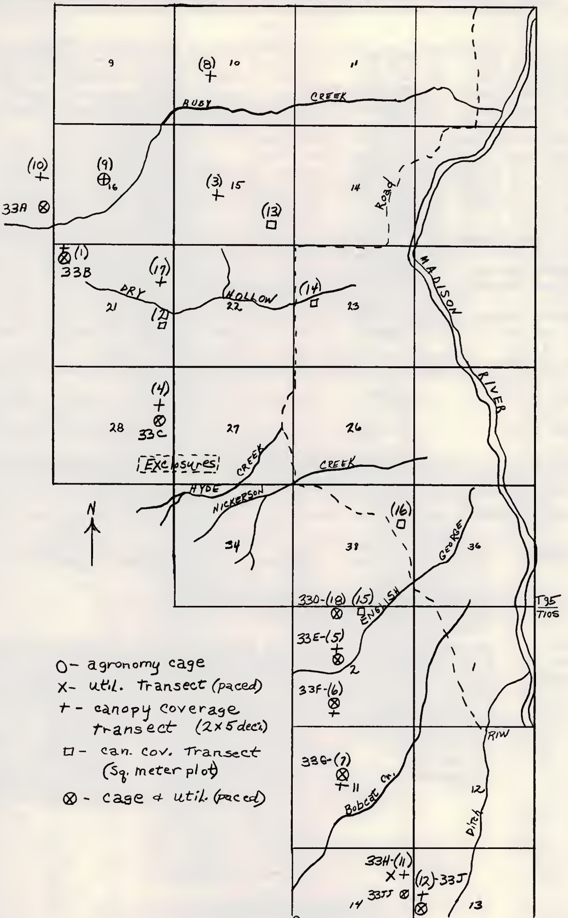

TABLE 5. Location and type of survey on Wall Creek area made by Montana Fish and Game Department.

Plot No.	Locale	Land Ownership	Type of Plot
8	Ruby Creek Ridge, S10 SW¼ NW¼	Game Range	Canopy coverage transect
10	Ruby Creek Slope, S17 SE¼ NE¼	National Forest	Canopy coverage transect
33A	Ruby Creek Slope, S17 NE¼ SE¼	National Forest	Util. cage and transect
9	Ruby Creek Slope, S16 SE¼ NW¼	National Forest	Canopy coverage transect & util. cage
3	Dry Hollow Ridge, S15 NE¼ SW¼	Game Range	Canopy coverage transect
13	NW of Lichte Bld. S15 SE¼ SE¼	Game Range	Square meter plot
1	Dry Hollow Ridge, S21 NW¼ NW¼	National Forest	Util. Cage & canopy cov. trans.
17	Dry Hollow Ridge, S21 SE¼ NE¼	Game Range	Canopy coverage transect
2	Dry Hollow Ridge, S21 NE¼ SE¼	Game Range	Square meter plot
14	N. of Holt Bldgs, S23 SW¼ NW¼	Game Range	Square meter plot & Util. cage
4	Hyde Creek Ridge, S28 SE¼ NE¼	National Forest	Canopy coverage transect
16	Clark Field, S35 SE¼ NE¼	Game Range	Square meter plot
18	English George S2 NE¼ NW¼	National Forest	Utilization cage
5	English George S2 SE¼ NW¼	National Forest	Canopy coverage transect & util. cage
15	English George S2 NW¼ NE¼	Game Range	Square meter plot
6	English George S2 SE¼ SW¼	National Forest	Canopy coverage transect & util. cage
7	Bobcat Ridge S11 SE¼ NW¼	National Forest	Canopy coverage transect & util. cage
11	Kelly Hill S14 NE¼ NE¼	National Forest	Canopy coverage transect & util. cage
12	Kelly Hill S13 SW¼ NW¼	A. B. Kelly	Canopy coverage transect & util. cage
33JJ	Kelly Hill S14 SE¼ NE¼	National Forest	Util. cage and transect

TABLE 6. Classification of plant species found within the study areas by union and desireability.

Union	Decreaser	Increaser	Invader
Tall grass/forb	Agropyron spicatum Agropyron smithii Artemisia cana Oryzopsis hymenoides Stipa occidentalis	Artemisia dracunculoides Artemisia tridentata Lupinus argenteus Stipa comata	Cirsium spp.
Short-Medium grass/forb (short grass)	Agoseris glauca Aster striatus Carex filifolia Festuca idahoensis Koeleria cristata Myosotis alpestris Poa cusickii Poa epilis Poa secunda	Allium textile Astragalus agrestis Besseya cinera Castilleja spp. Erigeron compositus Geum triflorum Linum lewisii Lomatium spp. Lewisia columbiana Lithospermum ruderale Mertensia spp. Oxytropis sericea Potentilla gracilis Penstemon asides Senecio plattensis	Achillea lanulosa Artemisia frigida Bromus tectorum Chrysothamnus nauseosus Eriogonum spp. Gnaphalum chilense Gutierrezia sarothrae Taraxacum spp. Tetradymia canescens Tragopogon dubius

TABLE 6 - CONTINUED.

Union	Decreaser	Increaser	Invader
Moss/lichen		Selaginella densa Lichens	Antennaria spp. Descurainia richardsoni Cruciferae (annuals) Phlox spp. Saxifraga spp. Sedum stenopetalum

Litter and bare ground are each separate classifications. A "plant density index" is arrived at by adding litter and bare ground coverage and subtracting from 100. A "ground cover index" combines litter and plant cover.

For purposes of achieving a condition rating, the canopy coverage data and ground cover index are used. Canopy coverage data, grouped into desireability classes, are applied to Part 1 of the Forest Service scorecard and a composition rating is obtained. Part 2B was used as a guide for vigor ratings. The ground cover index provides an estimate of plant and litter cover and may be applied to Part 3 of the scorecard ratings. A "vegetative score" is obtained.

Phenology ratings indicate stages of plant development at the time of the survey. Symbols used to indicate phenological state were: F-flowering; S-seed set; V-vegetative; Fr-fruiting.

Frequency data may help evaluate subsequent surveys and could be substituted for canopy coverage data in the foregoing system.

Of the fifteen areas studied, three were classified in good condition, eight in fair condition and four in poor condition. Of the ten studies which were made on "key" elk winter range, two were in good, six in fair and two in poor condition. Table 7 lists location, condition and suggested maximum allowable utilization for each area. Table 8 lists utilization data of Idaho Fescue across parts of the winter range obtained in April of 1962 and 1963. The percentage of plants grazed method was used. U. S. Forest Service Region 5 utilization chart for a bunch grass range was used to estimate utilization.

By comparing Tables 7 and 8, it is noted that of the six areas sampled in 1963, three received maximum or over-maximum allowable utilization and three were considerably under the suggested allowable use. The Kelly Hill plot (No. 11) received 50% utilization, the maximum allowable for a site in good condition.

Utilization data obtained in April 1962 suggest maximum or above maximum allowable use of three of the four areas sampled (Table 8). A Parker three-step paced transect was conducted on the Game Range in approximately the E½ S1 T10S R1W during 1962. The data shown are as follows: bare soil - 37%; rock - 13%; litter - 17%; moss - 8% with a plant density index of 25%.

The privately owned portion of Kelly Hill was sampled for utilization of current and past year's growth in the spring of 1962, 1963 and 1965. The data suggest light grazing with the heaviest use in 1964-65.

TABLE 7. Location, condition and suggested maximum utilization for ten key elk wintering sites, survey-July 1962.

Plot No.	Area		Condition	Suggested Maximum Utilization
1	Dry Hollow Ridge,	NW¼ NW¼ S21	Poor	30%
2	Dry Hollow Ridge,	SE¼ SE¼ S21	Fair	40%
3	Dry Hollow Ridge,	NE¼ SW¼ S15	Good	50%
4	Hyde Creek Ridge,	SE¼ NE¼ S28	Poor	20%
5	English George Cr.,	SE¼ NW¼ S2	Fair	40%
6	English George Slope,	SE¼ SW¼ S2	Good	50%
7	Bobcat Cr. Ridge,	SE¼ NW¼ S11	Low-Fair	30%
8	Ruby Cr. Ridge,	SW¼ NW¼ S10	Fair	40%
9	Ruby Cr. Slope,	SE¼ NW¼ S16	Fair	30%
10	Ruby Cr. Slope,	SE¼ NE¼ S17	Fair	40%

TABLE 8. Range analysis data, elk winter ranges, Areas 33, 35, 36, 37 and 318, 1961-1965.

Transect No.	Location	Mo. Yr.	Species	No. Plants	Pounds/Acre [1]		% Growth Used [2]	
					Caged	Open	Past	Current
Area 33								
33A (10)	Ruby Creek	10/61	Agsp				65u[3]	
		4/63	Agsp	50			10	2
		8/63	Feid				20u	
		11/63			1833			
		9/64			1780	1540[A]	13u	
		6/65			840	480[A]	43u	
		6/65	Feid	100			90	
		6/65	Agsp	100			17	
33B (was 386) (1)	Dry Hollow	8/61	Feid	100			0-5u	
		5/62	Feid	100			41	33
		Fall/62			1330	700	47u	
		4/63	Feid	50			54	12
		8/63	Feid				60u	
		11/63			2700	160	94u	
	Wall Cr. G.R.	11/63				1013	0	
		8/64	Feid	100			51	
		8/64	Agsp	82			36	
		9/64			2160	780[A]	64u	
		6/65			640	N/A[A4]	0	
		6/65	Agsp	100			35	
33C (was 385) (4)	Hyde Creek	8/61	Feid	100			0-5u	
		5/62	Feid	106			55	
		4/63	Feid	50			30	2
		8/63	Feid				74u	
		5/64	Feid	36			10	2
		5/64	Agsp	100			85	9
		9/64	Feid	100			58	

TABLE 8. - CONTINUED.

Transect				No.	Pounds/Acre 1		% Growth Used 2	
No.	Location	Mo. Yr.	Species	Plants	Caged	Open	Past	Current
33C (was 385)	Hyde Creek	9/64	Agsp	100			74	
		6/65	Feid	100			98	
		6/65	Agsp	100			95	
33D (18)	No. English Geo.	Fall/62			630	N/A	0	
		11/63			2133	566	73u	
		9/64			1600	N/A	0	
		6/65			1800	420[A]	77u	
		6/65	Feid	100			64	
33E (was 383) (5)	English George	10/61	Feid				47u	
		10/61			533	183	66u	
		5/62	Feid	100			49	
		Fall/62			300	N/A	0	
		4/63	Feid	50			30	6
		8/63					14u	
		11/63			2366	333	86u	
		9/64			3740	1500[A]	60u	
		9/64	Feid	100			17	
		9/64	Agsp	100			47	
		6/65			CM[5]			
		6/65	Feid	100			42	
		6/65	Agsp	100			32	
33F (6)	So. English Geo.	Fall/62			400	N/A	0	
		4/63	Feid	50			40	4
		8/63					18u	
		11/63			1500	600	60u	
		5/64	Agsp	50			30	3
		5/64	Feid	50			30	22
		9/64			1820	N/A	0	
		9/64	Feid	100			6	
		9/64	Agsp	100			22	
		6/65			1380	420[A]	70u	
		6/65	Feid	100			54	
33G (7)	Bobcat Creek Ridge	10/61			700	316[C]	55u	
		Fall/62			550	N/A	0	
		4/63	Feid	50			40	10
		11/63			966	633	34u	
		9/64	Feid				2	
		9/64	Agsp				14	
		6/65	Feid	100			87	
		6/65			1400	1180[A]	16u	
33H (was 378) (11)	Kelly's Hill (F.S.)	4/62	Feid	100			31	8
		4/63	Feid	50			66	2
		8/63	Feid				20u	
		6/65	Feid				18	

TABLE 8 - CONTINUED.

Transect				No.	Pounds/Acre 1		% Growth Used 2	
No.	Location	Mo. Yr.	Species	Plants	Caged	Open	Past	Current
33J	Kelly's Hill (Priv.)	4/61	Feid	100			0-5u	26u
(12)		4/63	Feid	50			16	2
		11/63	w/o Agsp		400			
		11/63			1600			
		9/64			1200			
		6/65	Feid	100			39	
33K	W.Fork Blacktail	4/62	Feid	100			92	
(was 395)	(Low)	5/63	Agsp	50			1	0
		5/63	Heki	50			0	0
33L	W.Fork Blacktail	4/62	Feid	100			83	
(was 397)	(Middle)	5/63	Feid	100			1	2
33M	W.Fork Blacktail	4/62	Feid	100			91	
(was 396)	(High)	5/63	Feid	100			46	5
		5/63	Agsp	100			16	3
33N	Middle Fork Black-							
(was 173)	tail	5/61	Feid	100			17	
		5/62	Feid	100			17	
		5/63	Feid	100			3	1
33P	Alkali Creek	5/62	Feid	100			32u	
(was 276)		4/63	Feid				0	
33PP	Alkali Creek	8/61	Feid	100			12	
(was 277)								
33Q	East Fork Black-							
	tail	4/62	Feid	200			64u[6]	
(was 292)	(High)	5/63	Feid	100			0	0
33R	East Fork Black-							
	tail	4/62	Feid	100			72u	
(was 393)	(Middle)	5/63	Feid	100			18	0
33S	East Fork Black-							
	tail	4/62	Poa	100			60u	
(was 394)	(Low)	5/63	Feid	50			58	3
33T	Jake's Canyon	9/59	Feid	100			24	
(was 352 & 181)		4/60	Feid	100			33	
		8/61	Feid	100			17	
		5/62	Feid	100			52	
33U	Centennial	5/62	Feid	100			16	
(was 214)	(Big Hill)	4/63	Feid	50			0	

TABLE 8 - CONTINUED.

Transect No.	Location	Mo. Yr.	Species	No. Plants	Pounds/Acre[1] Caged	Open	% Growth Used[2] Past	Current
33V (was 263)	Murphy Creek (Staudenmeyer's)	8/59	Feid	100			0-5u	
		8/61	Feid	100			19	
		5/62	Feid	100			19	
		4/63	Feid	100			18	
33W (was 198)	Robb Creek	8/61	Heki				0-5u	
		8/61	Feid				0-5u	
		5/62	Heki	100			76	
		5/62	Feid	100			16	
		4/63	Heki	50			16	
		4/63	Feid	50			6	

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[1] Method - No. .96 sq. ft.; A-5 in and out, B-20, C-5, D-10.

[2] Percent grazed plants unless otherwise indicated.

[3] U - utilization.

[4] Not-Applicable.

[5] Cage moved.

[6] Average of two transects.

The fall clipping data for 1961, 1962, 1963 and 1965 are presented in Table 8. Utilization checks of five areas in late October, 1962 suggested that only one, Dry Hollow Ridge (Plot No. 1), was used extensively by cattle. This area was checked through the preceding summer at various intervals. A September 1 check revealed under 25% utilization. By this time, cattle were using the summer range. A storm occurred after this date and cattle were seen using the area September 12. A check on September 17 indicated 38% utilization. The clipping data obtained October 29 suggested 47% utilization which compares with the 40% utilization by percentage of plants grazed method obtained in April 1963. Very little elk sign was observed on this area at that time, and no elk were seen on the area the preceding winter. The difference between the fall utilization by clipping and the spring utilization by percentage of plants grazed could be due to the difference in use of other species which would be sampled in the fall but not in spring, when only Idaho fescue was considered.

Utilization checks by percentage of plants grazed on five areas obtained in August, 1963 after cattle left the lower range suggested light use on areas sampled, except on the ridge between Hyde Creek and Dry Hollow and the ridge between Dry Hollow and Ruby Creek. Of the five areas which were clipped in November, four were found to have heavy utilization ranging from 60 to 94%. The other area, the Bobcat Ridge, had use of 34%.

The areas sampled are all considered primary elk winter range. It would appear that utilization of these localities by cattle, with the exception of the two ridge tops previously mentioned, was not excessive when the spring grazing season ended on August 1. The problem of heavy utilization could be alleviated if, when cattle appear on this lower range after August 1, they are immediately removed.

Horses, presumably belonging to an outfitter camped in Bobcat Creek, were observed to use the slope between Bobcat Creek and English George Creeks extensively this past fall. It is thought that these horses should be tethered and fed hay during the hunting season for the benefit of the elk and livestock which are dependent on this forage.

The two ridge tops mentioned appear to be favored foraging areas for cattle due to the level topography, the salting station on the Hyde Creek-Dry Hollow Ridge, and the adjacent water development on the Ruby-Dry Hollow Ridge. The possibility of moving these attractions should be investigated.

The data suggest that elk were responsible primarily for utilization of five of the eight areas sampled in 1963. The three areas where cattle use was observed in conjunction with elk use were Dry Hollow Ridge (Plot 1) and Kelly Hill (Plot 11), on National Forest land, and the private portion of Kelly Hill.

The utilization obtained in the fall of 1961 on English George Creek (66%) by clipping is considerably higher than the utilization by percentage of plants grazed obtained the following spring (36%). Again, only Idaho fescue was considered in the spring.

Locales, which may be considered "key" elk-cattle competition areas, based on the foregoing information, would include: Kelly Hill, English George Creek, Bobcat Creek Ridge, and Dry Hollow Ridge. Elk wintering areas of major importance would include the above four areas plus the Hyde Creek Ridge and English George slopes. Further observations may expand the list of both types of areas.

During July, 1963 forty Daubenmire two-by-five decimeter plots were run in the three exclosures and a control on Hyde Creek. A summary of the data is presented in Table 9.

Information on elk winter range, condition and trend in Area 33 is presented but not interpretated in Table 10.

Aerial flights to determine elk distribution patterns have been made the past two winters. These flights were supplemented with ground observations. The flights were conducted at two-week intervals with some modification due to weather and work loads. Table 11 summarizes the information.

The 1961-1962 winter began early and elk appeared on the lower slopes in November during the hunting season. Aerial observation began in February and over 100 elk were observed on the Ruby Creek-Dry Hollow Creek ridge. A group of 12 was observed in the Bobcat Creek area (Section 14). Aerial observation lasted through early March with the bulk of the observations directed to the Ruby Creek-Dry Hollow Ridge and north of Ruby Creek on the south slopes facing the creek of Sections 9, 10, 16 and 17. A large group (120) was seen on Section 23 in late February. One hundred thirty-one elk were observed on Sections 26 and 27 of Hyde Creek Ridge in mid-February. By late April, elk appeared to have dispersed into smaller groups. Elk were seen on Section 34 between Nickerson and English George Creek at that time. Use of the Kelly Ridge (Section 14) was evident at this time also.

In 1962-1963, weather conditions were mild through January. A group of 12 elk were observed in the Hyde Creek Basin in December.

Aerial flights began in early January. Two groups of elk numbering about 40 in each were observed, one in the English George-Nickerson Creek area (Section 34) and the other on the Bobcat Creek area (Section 14). Elk were observed on the highest ridges between Horse Creek and Wall Creek basin but none were seen on the Hyde Creek basin area. These groups were seen through mid-February. In late February, 140 elk were observed on Kelly Hill (Section 14) and over 40 more in the English George-Nickerson Creek area immediately south of Wall Creek Ranger Station (Section 34). A group of 13 was observed on Section 27, Hyde Creek Ridge, at this time. In mid-March, 70 elk were seen on Kelly Hill, another 70 in English George Creek (Section 3), and another untallied

TABLE 9. Summary of Daubenmire plot data[1] - Hyde Creek exclosures, Area 33, July 1963.

	Total		Cow		Open		Elk	
Species	Can. Cov.	Freq.	Can. Cov.	Freq.	Can. Cov.	Freq.	Can. Cov.	Freq.
Grasses and Grasslike								
Agropyron spicatum	12.50	72.5	7.38	42.5	9.25	40.0	4.69	62.5
Festuca idahoensis	32.82	100.0	15.70	100.0	21.00	100.0	38.58	100.0
Koeleria cristata	1.00	15.0	2.00	17.0	.44	17.5	1.44	20.0
Poa secunda	5.12	55.0	1.88	25.0	3.19	52.5	4.31	47.5
Stipa richardsoni	.38	2.5	13.06	77.5	1.60	15.0		
Carex filifolia			.19	7.5	.94	12.5		
Forbs								
Lupinus sericeus	12.76	87.5	7.63	60.0	3.63	35.0	10.51	67.5
Achillea lanulosa	1.00	15.0	.57	10.0	2.38	32.5	1.32	15.0
Selaginella densa	9.82	45.0	5.94	85.0	2.40	17.5	8.76	47.5
Artemisia frigida	.38	2.5	1.63	27.5	.94	12.5	.75	2.5
Phlox spp.	.06	2.5	3.06	22.5	.06	2.5		
Antennaria media			4.19	55.0	1.38	17.5	.50	7.5
Arenaria congestens			.76	17.5	.31	12.5	.06	2.5
Allium spp.			.06	2.5				
Unidentified forbs	7.50	45.0	8.44	75.0	8.94	62.5	10.25	67.5
Moss-like								
Moss	.87	10.0					.76	17.5
Lichens			.19	7.5	1.32	15.0		
Shrubs								
Chrysothamnus nauseosus	8.57	45.0			14.63	35.0	7.38	62.5
Chrysothamnus viscidiflorus			.94	12.5				
Artemisia tridentata			.06	2.5	.38	2.5		
Tetradymia canescens	1.32	15.0	1.75	10.0	2.45	15.0	3.20	20.0
Artemisia cana					.38	2.5		
Bare Ground	2.57	30.0	4.69	50.0	4.82	57.5	1.94	40.0
Rock	.63	12.5	.25	22.5	1.25	12.5	2.32	30.0
Litter	31.20	100.0	21.94	97.5	40.38	100.0	24.82	100.0

[1] Forty two-by-five decimeter plots.

TABLE 10. Grass condition and trend plots on elk winter range, 1959-1963.

Plot No.	Location		Mo.Yr.	Form Class % 1/		Density (inches)	Max. Leaf Ht. (in.)
				N & Y	HC & CE		
Area 33							
33B	Dry Hollow		8/61	44	56	20.2	3.6
33C	Hyde Creek		8/61	36	64	15.2	3.0
33E	English George		8/61	40	60	3.7	3.1
33T	Jakes Canyon		8/61	60	40	7.6	3.0
33V	Murphy Creek		8/59	33	67	16.2	3.8
	(Staudenmeyer's)		61	53	47	3.1	2.5
33W	Robb Creek	Feid	8/61	60	40	3.0	2.8
		Heki	8/61	20	80	23.5	9.6
33H	Kelly's Hill (F.S.)		8/61	64	36	3.0	4.2

TABLE 10 - CONTINUED.

Plot No.	Location	Mo.Yr.	Form Class % 1/ N & Y	HC & CE	Density (inches)	Max. Leaf Ht. (in.)
Area 37						
82	Bull Mountain	61	32	68	10.8	10.8
869	Potters Slope	61	70	30	3.8	5.9

			Form Class % N	HCR	HCD	CER	CED
Area 33							
33J	Kelly's Hill (Priv.)	63	44	3	0	2	1
33JJ	Kelly's Hill (F.S.)	63	24	6	4	4	12

1/ Key species is Feid unless otherwise indicated.

TABLE 11. Elk distribution, 1961-1962 and 1962-1963 winters.

Year	No. Seen	Date	Location
1962	102	Feb. 2	SW¼ S9 Ruby Creek
	2	Feb. 2	NW¼ S34 Hyde Creek
	12	Feb. 2	NW¼ S22 Dry Hollow
	96	Feb. 5	NW¼ S17 Ruby Creek
	28	Feb. 5	SW¼ S16 Ruby Creek
	12	Feb. 5	NW¼ S14 Bobcat Creek
	101	Feb. 5	NE¼ S27 Hyde Creek
	15	Feb. 12	SW¼ S22 Dry Hollow
	8	Feb. 12	NE¼ S27 Hyde Creek
	120	Feb. 12	SW¼ S9 Ruby Creek
	105	Feb. 12	SE¼ S27 Hyde Creek
	130	Feb. 19	NE¼ S17 Ruby Creek
	4	Feb. 19	SE¼ S16 Ruby Creek
	131	Feb. 19	NE¼ S28 Hyde Creek
	50	Feb. 25	NW¼ S22 Dry Hollow
	20	Feb. 26	SW¼ S2 English George
	18	Feb. 26	NE¼ S10 Ruby Creek
	56	Feb. 26	SW¼ S10 Ruby Creek
	21	Feb. 26	NE¼ S16 Ruby Creek
	25	Feb. 26	NW¼ S16 Ruby Creek
	9	Feb. 26	NW¼ S23 Dry Hollow
	117	Feb. 26	NW¼ S23 Dry Hollow
	6	Feb. 26	SW¼ S23 Dry Hollow
	5	Feb. 26	SW¼ S35 English George
	19	Feb. 26	NW¼ S2 English George
	4	Feb. 26	NW¼ S11 English George
	9	Mar. 5	NW¼ S1 English George
	62	Mar. 5	SW¼ S23 Dry Hollow
	70	Mar. 5	NE¼ S28 Hyde Creek
	12	Mid-Dec.	SW¼ S5 Hyde Creek Basin
1963			
	40	Jan. 21	SE¼ S34 Nickerson Creek
	40	Jan. 21	NE¼ S14 Bobcat Creek
	13	Jan. 21	NW¼ S26 Wall Creek
	13	Jan. 21	SE¼ S20 Horse Creek
	140	Feb. 25	NE¼ S14 Bobcat Creek
	40	Feb. 25	NW¼ S2 English George

TABLE 11 - CONTINUED.

Year	No. Seen	Date	Location
1963 cont'd			
	13	Feb. 25	SE¼ S27 Hyde Creek
	70	Mar. 13	NE¼ S14 Bobcat Creek
	70	Mar. 13	NW¼ S2 English George
	40+	Mar. 13	SE¼ S34 Nickerson
	13	Mar. 13	NW¼ S25 Horse Creek
	7	Mar. 25	NW¼ S2 English George
	5	May 9	SW¼ S11 Bobcat Creek

group above the ranger station on Section 34. As aerial observation terminated, no elk had been seen further north than the Hyde Creek Ridge (Sections 26 and 27). Subsequent ground checks in April indicated use had been made of the NE¼ of Section 27, an old hayfield on the Game Range, and some elk had used the Ruby Creek area. In May, a few elk were seen on Bobcat Creek (Section 11) and the Kelly Hill.

The two years' observations reflect variations in distribution which were probably related primarily to weather and snow conditions. During the more severe winter of 1961-1962, elk were observed to use the Dry Hollow-Ruby Creek ridge on the northern part of the winter range. In 1962-1963, a mild winter, the large groups of elk were seen on the Kelly Hill and English George-Nickerson Creek areas on the southern part of the winter range.

Small groups of elk (under 20) were observed in the Horse Creek area both winters on the NW¼ of Section 25.

RECOMMENDATIONS FOR MANAGEMENT

1. The Wall Creek elk herd should be managed on the basis of range condition and trends and forage utilization. Idaho fescue and blue bunch wheatgrass are key indicator species for utilization surveys.

2. The range condition and trend studies should be re-read every three to five years. Utilization data should be obtained in spring and fall each year. Gathering of data should be coordinated with the Forest Service, Madison Ranger District.

3. Elk distribution data should be obtained by aerial flights each winter until distribution patterns for a variety of winters are known.

4. A trapping and marking program should be instigated on this area to determine where these elk are being harvested and where they summer.

5. The Wall Creek area should be separated from the management Area 33 for hunting purposes. Possible boundaries would be: Johnny Ridge Road and the Talc Mine Road on the north; Gravelly Range Road on the west; Standard Creek on the south; Madison River on the east. An access road is planned for the Standard Creek area, with a bridge across the Madison River in that vicinity, which would provide a better boundary to the south as it is completed. This area lacks the easily accessible characteristics of much of the Gravelly-Snowcrest complex and consequently the elk are not as available during the hunting season as other populations within the complex area. The area may be modified as tagging information suggests when such information becomes available.

6. As the Wall Creek area is separated from the rest of the Gravelly-Snowcrest complex, a different type of hunting season may be considered. A general antlered bull season accompanied with a specified number of either sex permits is suggested. This would be a practical way of providing an easily regulated harvest in this limited area, yet still allowing a maximum amount of recreational hunting. The late closing would mollify the influence of variable weather conditions on the harvest.

7. A public relations program should be maintained to inform sportsmen and ranchers of progress in the management of this herd. Landowners should be contacted when range information is to be gathered adjacent to or upon their private lands. Every opportunity should be taken to emphasize to the public that the key to maintaining this elk herd in a healthy, productive state lies solely in maintaining a favorable balance between the herd itself and its habitat.

LITERATURE CITED

Coupland, R. T. 1961. A reconsideration of grassland classification in the northern great plains of North America. Jour. of Ecology 49:135-167.

Daubenmire, R. 1959. A canopy-coverage method of vegetation analysis. Northwest Sci. 33(1).

Evanko, A. and R. A. Peterson. 1955. Comparisons of protected and grazed mountain rangelands in southwestern Montana. Ecology 36(1).

Kirsch, J. B. 1962. Range use, relationship to logging, and food habits of the elk in the Little Belt Mountains, Montana. Unpub. M.S. Thesis, Montana State College. 44p.

Rouse, R. A. 1957. Elk food habits, range use and movements, Gravelly Mountains, Montana. Unpub. M. S. Thesis, Montana State College. 29p.

Submitted by: James Peek, Howard Chrest

Approved by: Joseph L. Egan

Date November 10, 1966

Wynn G. Freeman

APPENDIX I

SNOWCREST ELK CENSUSES 1947-1965

Gaab, J. E. 1947. Madison River Spring Investigation. (submitted May 5, 1947).

Ground count made by Warden Kohls in vicinity of Lichte ranches.
90 elk observed.

Hodder, R. L. 1948. Blacktail Elk Investigations: Aerial Elk Census. Project 1-R.

Used a Stinson Station Wagon for the census. Counted small bunches and photographed larger bunches of elk.

993 elk from Blacktail through Ledford Creek drainages.

Gaab, J. E. 1950. Gravelly Range Aerial Elk Census. (No further reference to publication)

Madison Drainage	182 total
Wigwam	15
Morgan Gulch	9
Buck's Nest	45
English George	113

Report states that both elk and mule deer were causing damage to Lichte ranch.

Gaab, J. E. 1950. Blacktail Elk Census. (No further reference to publ.)

Used Cessna 170.

Blacktail drainage through Ledford drainage. 1322 elk counted.

Gaab, J. E. 1951. Ruby River Aerial Elk Census.

Used Cessna 170.

Warm Springs through Cottonwood Creek. Seen 85.

Previous year (1950) census included in this report Idaho Creek through East Fork Ruby. Seen 159; of these,
51 from Warm Springs to Cottonwood
86 from Tributary Creek (East Fork Ruby)
12 from Idaho Creek

Recommended closed elk season on the Ruby drainage.

Gaab, J. E. 1951. Blacktail Aerial Elk Census and Gravelly-Snowcrest Mountains Elk Herd Relationships.

Super Cub 105 used.

Seen 906 elk. Only counted Blacktail.

APPENDIX I - CONTINUED.

History as cited in this report

1949 Harvest Blacktail	600	
1950 Aerial Census, Blacktail	1322	
1950 Aerial Census, Ruby	159	
1950 Aerial Census, Gravelly	182	
Total elk between Madison and Bend Rivers	1663	winter 1949-1950

1950 Harvest, Blacktail	491
1950 Harvest, Ruby	476
1950 Harvest, Madison	96
Total 1950 Harvest	1063

1951 Aerial Census, Blacktail	906
1951 Aerial Census, Ruby	85
1951 Ground Census, Madison	80
Total Elk Seen	1071

Estimated a huntable herd of 2128 animals in 1950.
harvest was 1063
estimated those left 1065
states the 1065 compares with the 1071 seen.

also, 42 elk above Elk Lake, and 32 above West Fork Madison not included in these calculations.

Townsend, J. E. 1957. Elk Surveys, W-73-R-2.

Aerial census gives the following figures:

Blacktail-Clark's Canyon	174
Blacktail-Ledford Creek	487
Ruby-Centennial	469
West side Madison	88
Total Elk Seen	1218

Townsend, J. E. 1958. Elk Surveys, W-73-R-3.

Aerial census:

Blacktail-Clark's Canyon	88
Ledford-Blacktail	335
Ruby-Centennial	471
West side Madison	249
Total Elk Seen	1143

Townsend, J. E. 1959. Elk Surveys, W-73-R-4.

Centennial	355
Blacktail Ridge	142
Blacktail-Ledford	389
Ruby	124
Lower Ruby	53
West Fork Madison	50
West side Madison	193
Total Elk Seen	1306

APPENDIX I - CONTINUED.

Townsend, J. E. 1962. Aerial Elk Census. (Figures approximate)

Blacktail	850
Ruby	150
Centennial	300
Madison	300
Total Elk Seen	1500

1963-1965 Aerial Elk Surveys. See Table 22, Job Completion Report, W-73-R-8-9-10, Job A-1 "Elk Surveys and Investigations."

APPENDIX II

SUMMATION OF CENSUS DATA-GRAVELLY-SNOWCREST

Year	Blacktail-Ledford	Centennial	Lower Ruby	Upper Ruby	W. Fork Madison	Wall Cr. Area	Lower Madison (Johnny Gulch N)	Totals
1947						90		90
1948	993							993
1950	1322		12	137		158[1]	24	1663
1951	906			85	84	80		1155
1957	661	469				88		1218
1958	423	471				249[1]		1143
1959	531	355	53	124	50	193[1]		1306
1962	850	230	161		32	256	65	1590
1963[2]	275	158	50	98	21	189	37	828
1964[3]								
1965[3]								

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[1] Includes West Fork and/or Lower Madison.

[2] No intensive effort to gain representative data, except on Wall Creek area.

[3] See Table 22, Job Completion Report W-73-R-8-9-10, Job A-1 "Elk Surveys and Investigations"

APPENDIX III

Rough Draft #2
MG/jms
December 21, 1960

Montana Fish and Game Commission
State of Montana

U. S. Department of Agriculture
Forest Service

This supplement #1 to the Agreement between the Montana Fish and Game Commission and the Northern Region, U. S. Forest Service, dated ____________________, between the ________________________, hereinafter called the Commission, and The United States Forest Service, through the Regional Forester, hereinafter called the Forest Service:

Whereas, the Commission operating under the laws of the State of Montana has purchased the base property of W. D. Holt & Sons accompanied by a Waiver of Grazing Preference for 311 head of cattle in favor of the United States; and

Whereas, it is not the intent of the Regulations and policies of the Secretary of Agriculture to transfer a grazing preference to State agencies; and

Whereas, it is the desire of the Commission and the Forest Service to provide adequate forage and cover for game animals consistent with other necessary and important uses of the national-forest; therefore,

It is the policy of the Forest Service, and it agrees:

1. To consult with the Commission regarding the present and future needs of wildlife prior to any action that would increase permitted livestock numbers or extend the season for livestock use on the Wall Creek allotment of Madison Ranger District, Beaverhead National Forest, as shown on the attached map;

2. To withhold restocking of the numbers of the grazing perference waivered as part of this agreement and not to increase permitted livestock numbers unless the range shows satisfactory condition and trend based on the attached range criteria or allotment management plan.

APPENDIX III - CONTINUED.

The Commission agrees:

1. To provide for control of game populations to maintain satisfactory condition and trend based on the attached range criteria or wildlife habitat management plan.

2. To assist the Forest Service in preparation and application of wildlife habitat management plans covering the herd unit involved.

3. To assume the responsibility for maintenance of the fence now owned by W. D. Holt and Sons.

4. To the future division of the Wall Creek allotment to provide for improved livestock management and supervision as determined by the Forest Service.

The Forest Service and Commission agree:

That amendments to this Memorandum of Understanding may be proposed by either party, and shall become effective upon approval by both parties.

MONTANA FISH & GAME COMMISSION

By____________________
(Title)

____
(Date)

U. S. FOREST SERVICE

By____________________
(Regional Forester)

Appendix A

At this date analysis of the Wall Creek allotment has not been completed or the revised management plans prepared. Pending completion of these tasks which is scheduled for Fiscal Year - 1963, the following tentative criteria will be used as the basis for management for this allotment. These will be subject to change by the Forest Service if indicated by the analysis and plans after consultation with the Montana Fish and Game Department.

APPENDIX III - CONTINUED.

1. Poor Condition. The objective will be maintenance of upward vegetative trend and 30 percent total annual utilization of key bunchgrasses. Utilization may be reduced as required by special soil, ground cover or slope conditions.

2. Fair Condition. Same as poor condition except that the annual total utilization objective will be 40 percent on key bunchgrasses.

3. Good Condition. Same as poor condition except that the annual total utilization objective will be 50 percent.

4. Primary Cow Range which is Primary Elk Winter Range. 50 percent of the allowable utilization will be allocated to elk.

5. Primary Elk Winter Range which is Secondary Cow Range. Ten percent of the allowable utilization will be allocated to cows.

APPENDIX IV

Name - Dry Hollow Ridge, Plot No. 1
Date - July 6, 1962
Reference - in pass, NW¼ NW¼ S21
Slope - 0-5°
Exposure - South
Soil - rocky, sheet erosion present
Remarks - Poor, 25% utilization

Union	Species	Phen.[1]	Can. Cov. % [2]	Freq.
Tall Grass	Agropyron smithii	f	1.6	27.5
	Agropyron spicatum	f	0.9	7.5
Short Grass	Achillea lanulosa	f	0.6	2.5
	Artemisia frigida	fr	11.6	75.0
	Carex filifolia	v	0.6	12.5
	Erigeron compositus	f	1.3	27.5
	Festuca idahoensis	fr	16.6	90.0
	Koeleria cristata	f	4.8	45.0
	Lewisia columbiana	f	0.6	20.5
	Lomatium montanum	s	0.1	1.5
	Oxytropis sericea	s	0.8	32.5
	Poa secunda	fr	9.0	67.5
	Potentilla gracilis	v	0.2	7.5
	Taraxacum spp	v	2.0	30.0
	Unidentified forbs	v	1.2	17.5
Moss	Antennaria rosea	f	7.5	45.1
	Saxifraga spp.	v	1.6	27.5

[1] Phenology: D-dormant, F-flowering, S-seed set, V-vegetative growth, Fr-Fruiting, G-germinated seedlings.

[2] Canopy-Coverage percent.

Union	Decreasers	Increasers	Invaders	Mean
Tall Grass	1.3/16.5	-	-	1.3/16.5
Short Grass	6.2/53.7	0.6/17.9	8.1/35.8	4.9/35.8
Moss	-	-	9.1/24.2	9.1/24.2
c/f[1] index	3.8/23.4	0.6/17.9	8.6/30.0	

Bare ground c/f	41.3/100
Litter c/f	30.6/72.5
Plant density index	28.1
Ground cover index	58.7

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[1] Coverage/frequency

APPENDIX IV - CONTINUED.

Name - Dry Hollow Creek, Plot No. 2
Date - July 7, 1962
Reference - along road in creek bottom, NE¼ SE¼ S21
Slope - 0-5°
Exposure - East
Soil - Sheet erosion evident, plants pedicelled
Remarks - Fair condition

Union	Species	Phen.	Can. Cov. %	Freq.
Tall Grass	Agropyron spicatum	f	7.8	44
	Artemisia dracunculoides	v	4.2	32
	Artemisia tridentata	v	5.3	24
	Lupinus argenteus	v	1.2	4.0
Short Grass	Festuca idahoensis	f	21.4	60.0
	Koeleria cristata	f	1.4	16
	Poa secunda	f	7.9	48
Moss	Antennaria rosea	fr	12.6	52
	Annuals	v	0.7	8.0

Union	Decreasers	Increasers	Invaders	Mean
Tall Grass	7.8/44.0	3.6/20	-	5.7/32
Short Grass	10.2/31	-	-	10.2/31
Moss	-	-	6.7/30	6.7/30
c/f index	9.0/37	3.6/20	6.7/30	

Bare Ground c/f	60.6/100
Litter c/f	14.2/100
Plant density index	25.2
Ground cover index	39.4

APPENDIX IV - CONTINUED.

Name - Dry Hollow Ridge, Plot No. 3
Date - July 3, 1962
Reference - 204° azimuth from Ranger Station NE¼ SW¼ S15
Slope - 11°
Exposure - Southeast
Soil - -
Remarks - Good condition, 50% utilization

Union	Species	Phen.	Can. Cov. %	Freq.
Tall Grass	Agropyron spicatum	f	8.5	62.5
	Stipa columbiana	f	0.1	5.0
	Lupinus argenteus	f	0.1	2.5
Mid Grass	Haplopappus acaulis	f	9.4	55.0
	Koeleria cristata	f	4.4	42.5
	Poa secunda	f	6.7	42.5
	Lomatium montanum	fr	0.8	7.5
	Eriogonum ovalifolium	f	0.5	12.5
	Achillea lanulosa	f	0.1	2.5
	Tetradymia canescens	v	0.1	2.5
	Artemisia frigida	v	0.9	12.5
	Astragalus striatus	f	4.9	22.5
	Festuca idahoensis	f	22.3	92.5
	Oxytropis sericea	f	3.7	15.0
	Lewisia columbiana	f	1.5	12.5
	Allium spp. (textile)	v	0.2	7.5
	Linum lewisii	f	0.6	12.5
	Penstemon aridus	fr	0.5	7.5
	Castilleja spp.	f	0.5	7.5
Moss	Selaginella densa	v	15.9	50.0
	Antennaria spp.	f	6.0	35.0
	Sedum stenopetalum	v	1.3	15.0
	Phlox hoodii	v	1.6	25.0

Union	Decreasers	Increasers	Invaders	Mean
Tall Grass	4.3/33.7	0.1/5	-	2.2/19.3
Short Grass	11.1/59.2	2.7/11.3	0.4/5.8	4.7/25.4
Moss	-	15.9/50	3.0/18	9.4/34
c/f index	7.7/46.4	6.2/22.1	1.7/11.9	

Bare Ground c/f	13.5/100
Litter c/f	18.9/97.5
Plant density index	67.6
Ground cover index	86.5

APPENDIX IV - CONTINUED.

Name - Hyde Creek Ridge, Plot No. 4
Date -
Reference - East of trail crossing ridgetop SE¼ NE¼ S28
Slope - 17°
Exposure - South
Soil - rocky, Sheet erosion
Remarks - Poor condition, 20% utilization

Union	Species	Phen.	Can. Cov. %	Freq.
Tall Grass	Agropyron spicatum	f	12.1	87.5
	Stipa comata	f	0.1	2.5
	Artemisia dracunculoides	v	2.5	7.5
Short Grass	Astragalus agrestis	s	0.5	5.0
	Agoseris glauca	v	0.2	5.0
	Allium textile	s	1.6	40.0
	Achillea lanulosa	v	0.1	5.0
	Artemisia frigida	v	0.6	12.5
	Carex spp.	v	0.7	5.0
	Carex filifolia	v	0.1	5.0
	Chrysothamnus nauseosus	f	2.0	30.0
	Erigeron compositus	s	1.8	22.5
	Festuca idahoensis	f	2.2	37.5
	Koeleria cristata	f	6.7	50.0
	Oxytropis sericea	s	0.1	5.0
	Penstemon aridus	s	0.3	10.0
	Poa epilis	v	0.9	2.5
	Potentilla gracilis	fr	0.1	2.5
	Taraxacum spp.	v	0.1	2.5
Moss	Antennaria rosea	v	0.6	15.0
	Phlox hoodii	v	2.3	30.0
	Sedum stenopetalum	v	0.2	5.0
	Saxifraga cernua	fr	1.6	27.5
	Selaginella densa	v	31.2	57.5
	Compositae seedlings	v	3.0	35.0

Union	Decreasers	Increasers	Invaders	Mean
Tall Grass	12.1/87.5	1.3/5	-	6.7/46.2
Short Grass	1.8/17.5	0.7/14.2	0.7/12.5	1.1/14.7
Moss	-	31.2/57.5	1.2/18.1	16.1/37.3
c/f index	6.9/52.5	11.1/15.6	1.0/15.3	

Bare Ground c/f	45.4/100
Litter c/f	0.7/12.5
Plant density index	53.9
Ground Cover index	54.6

APPENDIX IV - CONTINUED.

Name - English George Creek, Plot No. 5
Date - July 7, 1962
Reference - Just inside Forest boundary, north of creek, SE¼ NW¼ S2
Slope - 0-5°
Exposure - South
Soil - Some erosion evident
Remarks - Fair condition, 40% utilization

Union	Species	Phen.	Can. Cov. %	Freq.
Tall Grass	Agropyron spicatum	f	2.0	42.5
	Artemisia cana	f	0.4	5.0
	Artemisia dracunculoides	v	0.9	12.5
	Lupinus argenteus	f	7.8	15.0
	Stipa comata	f	3.8	52.5
Short Grass	Allium textile	s	0.4	5.0
	Achillea lanulosa	v	0.4	5.0
	Aster striatus	f	0.4	5.0
	Compositae unidentified	s	1.4	20.0
	Erigeron compositus	v	1.7	20.0
	Artemisia frigida	v	1.3	5.0
	Festuca idahoensis	f	8.9	97.5
	Koeleria cristata	f	1.2	27.5
	Poa secunda	fr	28.6	97.5
Moss	Antennaria rosea	fr	10.6	82.5
	Cruciferae (annuals)	v	.3	10.0
	Selaginella densa	v	14.8	55.0

Union	Decreasers	Increasers	Invaders	Mean
Tall Grass	1.2/23.7	4.2/10.8	-	2.7/12.2
Short Grass	9.8/56.9	1.2/15	0.9/5.0	4.0/25.6
Moss	-	14.8/55.0	5.4/46.2	10.1/50.3
c/f index	5.5/40.3	6.7/26.9	3.2/25.6	

Bare Ground c/f	25.3/100
Litter c/f	1.8/25
Plant density index	72.9
Ground cover index	74.7

APPENDIX IV - CONTINUED.

Name - English George Slope, Plot No. 6 (33F)
Date - July 7, 1962
Reference - 31° azimuth from Sphinx SE¼ SW¼ S2
Slope - 13°
Exposure - East
Soil - Good soils, very little erosion
Remarks - Good condition, 50% utilization

Union	Species	Phen.	Can. Cov. %	Freq.
Tall Grass	*Agropyron spicatum*	fr	6.1	50
	Artemisia dracunculoides	v	10.9	55
	Lupinus argenteus	f	9.6	67.5
	Stipa comata	f	0.4	5.0
Short Grass	*Artemisia frigida*	v	0.3	2.5
	Aster striatus	v	0.1	5.0
	Boraginaceae (unidentified)	v	0.9	10.0
	Achillea lanulosa	f	0.1	5.0
	Besseya cineria	s	0.1	5.0
	Festuca idahoensis	fr	21.7	97.5
	Koeleria cristata	fr	1.5	22.5
	Oxytropis sericea	f	2.2	15.0
	Poa secunda	fr	9.0	57.5
	Potentilla gracilis	v	0.5	7.5
Moss	*Antennaria rosea*	fr	0.2	7.5
	Saxifraga spp.	fr	0.1	5.0
	Selaginella densa	v	28.5	82.5
	Cruciferae spp.	v	0.1	2.5
--	Unidentified forbs and seedlings	v	3.4	35.0

Union	Decreasers	Increasers	Invaders	Mean
Tall Grass	6.1/50	5.9/42.5	-	6.5/46
Short Grass	8.1/45.6	0.9/9.4	0.2/3.7	3.1/19.6
Moss	-	28.5/82.5	0.1/5.0	14.3/42.7
c/f index	7.1/47.9	13.1/44.6	0.1/4.3	
Bare ground c/f	4.5/37.5			
Litter c/f	17.6/80			
Plant density index	77.9			
Ground cover index	95.5			

APPENDIX IV - CONTINUED.

Name - Bobcat Ridge, Plot No. 7 (33G)
Date - July 7, 1962
Reference - 20° azimuth to Sphinx SE¼ NW¼ S11
Slope - 9°
Exposure - South
Soil - Rocky, thin, and granitic
Remarks - Fair condition, 30% utilization

Union	Species	Phen.	Can. Cov. %	Freq.
Tall Grass	Agropyron spicatum	f	1.7	35.0
	Stipa comata	f	1.8	20.0
	Artemisia dracunculoides	v	0.3	7.5
Short Grass	Achillea lanulosa	v	0.1	2.5
	Allium textile	s	1.2	2.5
	Astragalus striatus	f	3.1	27.5
	Boraginaceae (unidentified)	v	0.4	15.0
	Chrysothamnus nauseosus	f	1.0	15.0
	Erigeron compositus	v	1.5	35.0
	Festuca idahoensis	f	17.8	100.0
	Koeleria cristata	f	0.8	20.0
	Oxytropis sericea	fr	0.1	5.0
	Penstemon aridus	fr	0.1	2.5
	Poa secunda	f	2.5	27.5
Moss	Antennaria rosea	s	6.3	47.5
	Saxifraga spp.	fr	5.8	47.5
	Selaginella densa	v	69.1	100.0
---	Unidentified composites	v	1.9	27.5

Union	Decreasers	Increasers	Invaders	Mean
Tall Grass	1.7/35.0	1.1/14	-	1.4/25
Short Grass	7.3/49.1	1.1/14.6	0.6/8.9	3.0/24.2
Moss	-	69.1/100	6.1/47.5	37.6/73.8
c/f index	4.5/42.1	24.1/42.9	3.3/28.2	
Bare ground	5.5/55			
Litter c/f	0.2/7.5			
Plant density index	94.3			
Ground cover index	94.5			

APPENDIX IV - CONTINUED.

Name - Ruby Creek Ridge, Plot No. 8
Date - July 5, 1962
Reference - 46° azimuth to Sphinx SW¼ NW¼ S10
Slope - 0-5°
Exposure - Ridgetop condition - fair
Soil - Rocky
Remarks - Fair condition, 30% allowable use

Union	Species	Phen.	Can. Cov. %	Freq.
Tall Grass	Agropyron spicatum	f	5.4	72.5
	Stipa comata	f	13.6	82.5
Short Grass	Artemisia frigida	v	4.8	40.0
	Astragalus striatus	f	0.9	10.0
	Carex filifolia	v	1.5	35.0
	Eriogonum ovalifolium	v	0.1	2.5
	Chrysothamnus nauseosus	f	4.5	4.5
	Lewisia columbiana	f	0.1	2.5
	Lomatium montanum	v	0.3	12.5
	Koeleria cristata	f	9.1	50.0
	Penstemon aridus	v	0.5	10.0
	Poa secunda	f	9.0	65.0
Moss	Antennaria spp.a	f	0.1	2.5
	Phlox hoodii	v	0.9	37.5
	Selaginella densa	v	39.9	100.0
---	Unidentified forbs and seedlings	v	2.0	32.5

Union	Decreasers	Increasers	Invaders	Mean
Tall Grass	5.4/72.5	13.6/82.5	-	9.5/77.5
Short Grass	6.5/50	0.3/8.3	2.3/23.5	3.0/27.3
Moss	-	21.0/66.2	0.5/40	10.9/53.1
c/f index	6.0/62	15/52.6	1.4/31.7	

Bare ground c/f	17.5/97.5
Litter c/f	10.6/92.5
Plant density index	71.9
Ground cover index	82.5

APPENDIX IV - CONTINUED.

Name - Ruby Creek Slope, Plot No. 9
Date - July 5, 1962
Reference - 192° azimuth to Red Ridge SE¼ NE¼ S16
Slope - 23°
Exposure - Southeast
Soil - Rocky, sheet erosion evident
Remarks - Fair condition, 30% allowable use

Union	Species	Phen.	Can. Cov. %	Freq.
Tall Grass	Agropyron spicatum	f	26.3	95
	Cirsium spp.	v	0.4	5
	Oryzopsis hymenoides	f	4.6	30
	Artemisia dracunculoides	v	0.8	7.5
Short Grass	Achillea lanulosa	v	0.3	2.5
	Artemisia frigida	v	0.5	10.0
	Astragalus striatus	f	8.1	27.5
	Allium textile	s	0.5	7.5
	Bromus tectorum	f	0.1	2.5
	Chrysothamnus nauseosus	f	4.9	35.0
	Eriogonum ovalifolium	v	0.1	2.5
	Castilleja spp.	f	0.1	5.0
	Festuca idahoensis	v	3.5	40.0
	Gnaphalium chilense	f	1.2	25.0
	Koeleria cristata	fr	3.3	32.5
	Linum lewisii	f	0.1	2.5
	Lithospermum ruderale	v	2.8	25.0
	Lomatium spp.	s	0.4	5.0
	Myosotis alpestris	s	0.1	2.5
	Oxytropis sericea	s	0.1	5.0
	Penstemon aridus	s	2.8	25.0
	Tragopogon dubius	f	0.4	5.0
	Tetradymia canescens	v	0.3	2.5
Moss	Cruciferae	v	0.4	15.0
	Phlox hoodii	v	3.2	30.0

Union	Decreasers	Increasers	Invaders	Mean
Tall Grass	15.4/62	0.8/7.5	0.4/5	5.5/24.5
Short Grass	2.3/25	1.8/14.2	1.6/11.2	1.9/16.8
Moss	-	-	1.8/22.5	1.8/22.5
c/f index	8.9/44	1.3/10.8	1.3/19.3	

Bare Ground c/f	59.5/100
Litter c/f	5.2/90
Plant density index	35.3
Ground cover index	40.5

APPENDIX IV - CONTINUED.

Name - Ruby Creek Slope, Plot No. 10
Date - July 5, 1962
Reference - 188° azimuth from Red Ridge, to right of small trail going up ridge
Slope - 28°
Exposure - South
Soil - Rocky - sheet erosion in some spots
Remarks - Fair condition, 30% allowable utilization

Union	Species	Phen.	Can. Cov. %	Freq.
Tall Grass	*Agropyron spicatum*	fr	28.9	90
	Artemisia dracunculoides	v	2.4	15
	Cirsium spp.	f	1.9	15
Short Grass	*Achillea lanulosa*	f	2.0	12.5
	Aster striatus	f	4.1	40.0
	Artemisia frigida	v	1.9	25.0
	Allium textile	s	0.6	12.5
	Castilleja cusickii	f	0.9	12.5
	Compositae (unidentified)	f	9.6	47.5
	Eriogonum ovalifolium	v	0.1	5.0
	Festuca idahoensis	fr	5.4	35.0
	Koeleria cristata	fr	5.4	52.5
	Linum lewisii	f	0.1	2.5
	Lithospermum ruderale	f	0.1	2.5
	Myosotis alpestris	fr	0.3	10.0
	Oxytropis sericea	s	2.0	10.0
	Poa secunda	f	4.1	40.0
	Penstemon aridus	s	0.2	7.5
	Tragopogon dubius	f	0.6	12.5
Moss	*Descurainia richardsonii*	f	1.3	27.5
	Cruciferae (annual)	v		
	Phlox hoodii	v	1.1	20.0
	Bare ground		49.4	100
	Litter		15.6	91.5

Union	Decreasers	Increasers	Invaders	Mean
Tall Grass	28.9/90	2.4/15	1.9/15	11.1/40
Short Grass	3.9/35.5	1.9/13.6	1.3/13.8	2.4/21.0
Moss	-	-	1.2/23.7	1.2/23.7
c/f index	16.4/62.7	2.2/14.3	1.5/17.5	
Bare ground c/f	49.4/100			
Litter c/f	15.6/91.5			
Plant density index	35			
Ground cover index	50.6			

APPENDIX IV - CONTINUED.

Name - Kelly Hill (National Forest Land) Plot No. 11
Date - July 31, 1963
Reference - Ridgetop between Bobcat and Wall Creek, transect runs west-east
Slope -
Exposure-
Soil-Shallow, but little erosion evident, some erosion pavement
Remarks -

Union	Species	Phen.	Can. Cov. %	Freq.
Tall Grass	Agropyron spicatum	fr	.50	7.5
	Lupinus sericeus	fr	11.45	85.0
	Chrysothamnus viscidiflorus	v	.75	5.0
	Stipa richardsonii	fr	.12	5.0
Short Grass	Festuca idahoensis	fr	29.62	100.0
	Polygonum bistortoides	s	1.63	40.0
	Poa secunda	v	1.56	37.5
	Artemisia frigida	v	.12	5.0
	Artemisia ludoviciana	v	.81	7.5
Moss	Selaginella densa	v	40.40	100.0
	Antennaria spp.	v	5.57	85.0
	Lichens		1.25	25.0
	Arenaria congestis	f	.38	15.0
	Erigeron compositus	f	.75	5.0
---	Unidentified forbs	v	7.63	92.5
	Rock		.38	2.5
	Bare Ground		2.38	35.0
	Litter		13.08	97.5

APPENDIX IV - CONTINUED.

Name - A. B. Kelly Property (Kelly Hill) Plot No. 12 (33J)
Date - July 22, 1963
Reference -
Slope - 4°
Exposure - Southeast
Soil - Shallow, very little loss evident, few pedicelled plants
Remarks -

Union	Species	Phen.	Can. Cov. %	Freq.
Tall Grass	Agropyron spicatum		4.5	25.0
	Stipa richardsonii		15.0	82.5
	Lupinus sereceus		19.9	80.0
	Chrysothamnus viscidiflorus		8.4	52.5
Short Grass	Festuca idahoensis		38.4	97.5
	Poa secunda		11.1	77.5
	Koeleria cristata		0.4	15.0
	Artemisia frigida		0.1	5.0
Moss	Phlox hoodii		0.10	5.0
	Selaginella densa		45.0	100.0
	Lichens		2.0	17.0
	Arennaria spp.		1.3	15.0
---	Unidentified forbs		0.6	22.5
	Rock		0.6	2.5
	Bare Ground		1.8	25.0
	Litter		16.4	72.5

Union	Decreasers	Increasers	Invaders	Mean
Tall Grass	40.7/53.8	40.8/80.0	17.5/52.5	
Short Grass	99.4/63.3	0.6/22.5	0.1/5.0	
Moss	-	97 /58.5	3/10	
c/f index				
Bare Ground c/f				
Litter c/f				
Plant density index	81.2			
Ground cover index	97.6			

APPENDIX IV - CONTINUED.

Name - N.W. of Lichte buildings, Plot No. 13
Date - July 7, 1962
Reference - SE¼ SE¼ S15
Slope - 0-5°
Exposure - East
Soil -
Remarks - Poor condition, abandoned hayfield, grown to Brte, some Agsm and Poas invading

Short Grass - 100/100 invader
Plant density index - 100
Ground cover index - 100

Name - North of Holt buildings, Plot No. 14
Date - July 7, 1962
Reference - SW¼ NW¼ S23
Slope - 0-5°
Exposure - East
Soil -
Remarks - Good condition

Union	Species	Phen.	Can. Cov. %	Freq.
Tall Grass	Agropyron spicatum	fr	13.3	88
	Stipa comata	f	1.8	32
Short Grass	Artemisia frigida	v	6.5	28
	Astragalus striatus	s	9.5	52
	Carex filifolia	fr	0.7	8.0
	Koeleria cristata	f	21.7	88
	Oxytropis sericea	v	0.1	4.0
	Poa secunda	f	5.1	72
Moss	Phlox hoodii	v	2.5	20

Union	Decreasers	Increasers	Invaders	Mean
Tall Grass	13.3/88	1.8/32	-	7.5/60
Short Grass	9.2/56	4.8/28	6.5/28	6.4/37
Moss	-	-	2.5/20	2.5/20
c/f index	11.2/72	3.1/30	4.5/24	

Bare Ground c/f	32/100
Litter c/f	16/96
Plant density index	52
Ground cover index	68